Syracuse Lake Vegetation Management Plan Update

Kosciusko County, Indiana

2006

http://129.79.145.7/arcims/statewide%5Fmxd/viewer.htm

Prepared for:

The Syracuse Lake Association
P.O. Box 152
Syracuse, Indiana 46567

Prepared by:

Aquatic Weed Control
P.O. Box 325
Syracuse, IN 46567

Executive Summary

Two aquatic vegetation surveys were conducted on Syracuse Lake in 2006. The first survey was conducted on June 23, 2006 and the second was conducted on August 9, 2006. The purpose of these surveys was to document any changes in the plant community from the 2005 surveys, and to monitor the lake's Eurasian watermilfoil population, along with the diverse native plant community.

Approximately 50 acres of Syracuse Lake were treated with the herbicide 2, 4-D on July 13, 2006. This treatment was designed to reduce the Eurasian watermilfoil population in Syracuse Lake. Eurasian watermilfoil grows in deep water in Syracuse Lake (~ 15 feet). This Eurasian watermilfoil does not show signs of active growth until mid-summer. For herbicide treatments to be effective, the plant must be actively growing so that it will take up the herbicide from the water. For this reason, the herbicide treatments on Syracuse lake take place later in the growing season than many Eurasian watermilfoil treatments on other lakes. The depth at which Eurasian watermilfoil grows in Syracuse Lake also limits treatment options, making 2, 4-D the most best and most cost effective choice. 2, 4-D treatments are not expected to eliminate Eurasian watermilfoil in Syracuse Lake but may help prevent the spread of the invasive plant.

The August 2006 survey found that Eurasian watermilfoil was effectively being controlled in the treatment areas, although there are still many areas of the lake where Eurasian watermilfoil is commonly collected. The large littoral zone of Syracuse Lake provides many areas of suitable habitat for Eurasian milfoil in off shore areas where disturbance caused by boating may help to cut and distribute the weed throughout the lake.

The 2007 management strategies may shift some treatment areas to new locations where Eurasian watermilfoil is becoming more abundant, with the hope that native plants will be colonizing previous treatment areas where the Eurasian watermilfoil population has been reduced. The further reduction of the Eurasian watermilfoil population should continue to help beneficial native plants compete and promote a more diverse plant community that offers better fish habitat and less recreational interference.

In spring of 2007, a visual inspection will be sufficient to identify areas of heavy infestation, and properly time herbicide treatments. A late season Tier II survey will be conducted to monitor the plant community.

2007 Cost Estimates

1. Chemically treat areas of Eurasian Watermilfoil Infestation

*All cost figures are estimates only. All prices are subject to change pending 2007 chemical pricing.

A.	Treat up to 50 acres of Eurasian milfoil with 2, 4-D	$ 18,000
B.	Treat purple loosestrife in wetland areas	$ 900

2. Conduct a late season Tier II survey to monitor both Eurasian milfoil and native plant populations.

A. Vegetation Survey and Plan Update	$ 4,000

Acknowledgements

Aquatic vegetation surveys conducted on Syracuse Lake were made possible by funding from the Syracuse Lake Association and the Indiana Department of Natural Resources through the Lake and River Enhancement Program. Aquatic Weed Control would like to extend special thanks to Indiana Department of Natural Resources (IDNR) District 3 Biologist Jed Pearson for providing procedural training for both Tier I and Tier II aquatic vegetation surveys. Gwen White and Angela Sturdevant, aquatic biologists for the IDNR Division of Fish and Wildlife provided valuable consultation regarding the requirements and objectives of this lake management plan. Brad Fink, and Jason Doll provided assistance and training for data analysis computer programs. Aquatic Weed Control would also like to thank the members of the Syracuse Lake Association for their commitment to improving this lake and for valuable discussion and input brought forward at the informational meeting held on October 10, 2006.

Table of Contents

List of Figures

List of Tables

1.0 Introduction

Syracuse Lake has been involved in the Lake and River Enhancement Program (LARE) since 2004, when the first LARE funded aquatic vegetation survey took place on August 14, 2004. Based on the results of this survey Eurasian watermilfoil (EWM) was found to be widely distributed throughout Syracuse Lake. The heaviest areas of EWM infestation were targeted for herbicide treatments. The following chart summarizes all LARE funded activities on Syracuse Lake.

Table 1: Syracuse Lake LARE History

Year	Action	Date	Funding Source
2004	Late Season Aquatic Vegetation Survey. Lake Management Plan Development	Late Season Survey August 14, 2004	Lake and River Enhancement Syracuse Lake Association
2005	Spring and Late Season Aquatic Vegetation Surveys as well 2, 4-D application and Management Plan Update	Spring Survey May 13, 2005 2, 4-D Application ~35 acres July 13, 2005 Late Season Survey August 5, 2005	Lake and River Enhancement Syracuse Lake Association
2006	Spring and Late Season Aquatic Vegetation Surveys as well as 2, 4-D application and Management Plan Update	Spring Survey May 18, 2006 2, 4-D Application ~50 acres July 13, 2006 Late Season Survey August 9, 2006	Lake and River Enhancement Syracuse Lake Association

2.0 Watershed and Lake Characteristics Update

(See 2004 Lake Management Plan)

Secchi disk readings remain acceptable in Syracuse Lake at around 9 feet. There have been no known significant changes to the watershed and water quality remains stable.

3.0 Lake Uses Update

(See 2004 Lake Management Plan)

Syracuse Lake continues to receive very high levels of public use during the summer months. Boaters and fishermen enter the lake from the public access on Syracuse Lake as well as through

the channel connecting Syracuse Lake with Lake Wawasee. Waterskiing, tubing, and jet skiing are all popular activities, as well as tournament bass fishing.

4.0 Fisheries Update

The most recent fisheries survey took place in the summer of 1997. The following species list was provided by District 3 Fisheries Biologist Jed Pearson. It summarizes population statistics for every species of fish collected at Syracuse Lake.

Table 2: IDNR 1997 Fisheries Survey Data

Relative Abundance and Size of Fish Collected at Syracuse Lake					
Common Name*	Number	Percent	Length range (in)	Weight (lb)	Percent
Bluegill	1014	61.1	1.8 - 8.5	71.81	16.8
Redear	272	16.4	2.8 - 10.9	71.08	16.6
Largemouth bass	67	4.0	3.9 - 15.8	32.24	7.5
Yellow perch	61	3.7	3.7 - 12.1	8.76	2.0
Yellow bullhead	50	3.0	6.0 - 13.3	45.08	10.5
Northern pike	39	2.4	14.3 - 28.4	77.50	18.1
Brown bullhead	23	1.4	4.5 - 14.3	19.06	4.5
Longnose gar	23	1.4	15.2 - 41.5	70.17	16.4
Black crappie	22	1.3	6.1 - 10.0	6.20	1.5
Warmouth	22	1.3	3.0 - 8.2	2.43	0.6
Longear	15	0.9	2.7 - 4.5	0.68	0.2
Rock bass	15	0.9	3.2 - 7.8	1.62	0.4
Bluntnose minnow	7	0.4	1.8 - 2.4	0.04	0.0
Spotted gar	6	0.4	23.0 - 28.8	11.36	2.7
Grass pickerel	4	0.2	9.5 - 12.5	1.09	0.3
Lake chubsucker	4	0.2	6.6 - 8.9	0.98	0.2
Hybrid sunfish	3	0.2	3.5 - 8.7	0.73	0.2
Starhead topminnow	3	0.2	2.3	0.01	0.0
Bowfin	2	0.1	16.5 - 22.0	5.54	1.3
Brook silverside	2	0.1	3.1 - 3.4	0.02	0.0
Pumpkinseed	2	0.1	4.3 - 5.2	0.17	0.0
Fathead minnow	1	0.1	2.0	0.01	0.0
Golden shiner	1	0.1	2.5	0.01	0.0
Smallmouth bass	1	0.1	12.1	0.83	0.2
	1659			427.42	

5.0 Problem Statement

Eurasian watermilfoil will continue to be the major challenge in maintaining a healthy plant community at Syracuse Lake. Herbicide treatments provide effective control on a yearly basis for Eurasian watermilfoil in the heaviest areas of infestation.

6.0 Management Goals and Objectives

The management goals outlined by the IDNR Division of Fish and Wildlife have not changed. They are restated below:

1. Develop or maintain a stable, diverse aquatic plant community that supports a good balance of predator and prey fish and wildlife species, good water quality and is resistant to minor habitat disturbances and invasive species.

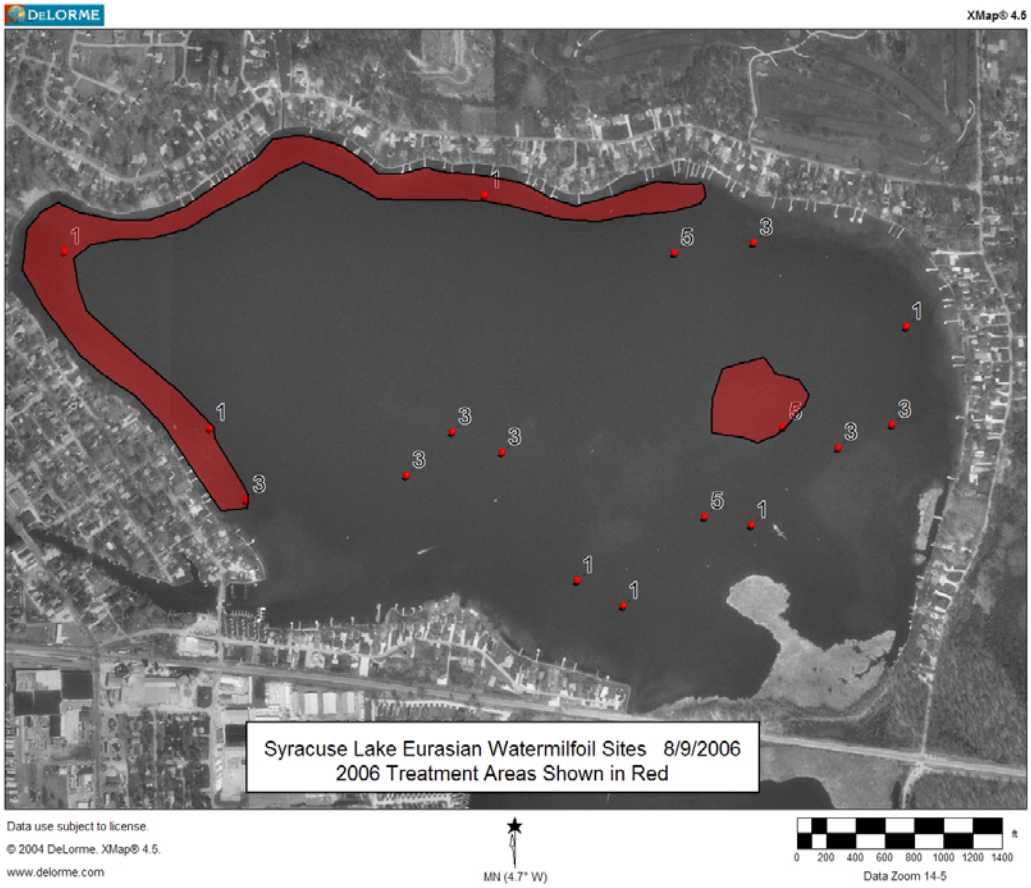
2. Direct efforts to preventing and/or controlling the negative impacts of aquatic invasive species.

3. Provide reasonable public recreational access while minimizing the negative impacts on plant and wildlife resources.

7.0 Plant Management History Update

The major changes to the plant management history have been the increase in acreage for LARE funded herbicide treatments from 35 acres to 50 acres. Permit acreages for the treatment of private lots have not changed significantly. A treatment map (Figure 1) shows an outline of the 2006 treatment areas, along with each sample site where Eurasian watermilfoil was collected in the August of 2006. Numbers beside each red dot indicate the rake score for Eurasian watermilfoil at that sample point.

Figure 1: Syracuse Lake 2006 Treatment Areas



8.0 Aquatic Plant Community Characterization Update

Two major changes have been adopted in LARE protocols that change the process of characterizing the plant community of Indiana lakes.

The first change is the switch from 2 Tier II surveys each year to just one Tier II survey per year. Prior to 2006, both a Tier I and a Tier II survey were required in both spring and August. This year's protocol changed to require a Tier I survey each spring, and A Tier II survey if the August, accompanied by a Tier I August survey to document any changes in the to plant community from spring to August.

The second change is in the formation of a new Tier II protocol. These changes are outlined in the methods section (8.1).

8.1 Methods Update

The Tier II survey protocol was changed by the IDNR in 2006. New LARE Tier II protocol requires that sample sites be stratified by depth contour. Prior to 2006 sites were to be spaced evenly through the littoral zone.

Before 2006, the number of sample sites required each lake were determined strictly by lake size. In the 2006 protocol, the number of sample sites needed is based on both lake size and trophic state. Trophic state describes the productivity of a lake and is correlated with plant growth, secchi disk, and nutrient availability. There are 4 different trophic states listed by the IDNR: Oligotrophic, Mesotrophic, Eutrophic, and Hypereutrophic. Oligotrophic Lakes usually have clear water and few nutrients, while Hypereutrophic lakes usually have deeply stained water and are nutrient rich. Table 3 is taken from the IDNR 2006 Tier II protocol and shows the maximum depth that must be sampled for a lake in each trophic state. In oligotrophic lakes, where water is clear, plants may be able to grow in up to 25 feet of water because sunlight may still reach the lake bottom in deep water. In hypereutrophic lakes where water is turbid, lack of sunlight will prevent plants from growing in deep water, so the maximum sampling depth is only 10 feet.

Table 3: Sample depth by Trophic State

Trophic State	Maximum Depth of Sampling (ft)
Hypereutrophic	10
Eutrophic	15
Mesotrophic	20
Oligotrophic	25

Table 4 is used to calculate the number of sample sites need in each depth contour by using lake size and trophic status. The new protocol attempts to more accurately describe the entire littoral zone of a lake and provide more detailed data analysis by separating the littoral zone into 5 foot depth segments.

Table 4: Sample Sites by Lake Size and Trophic State

Table 3. Sample size requirements as determined by lake size, trophic state, and apportioned by depth class.

		Hypereutrophic		Eutrophic			Mesotrophic				Oligotrophic				
Lake Acres	Total # of Sites	0-5 foot contour	5-10 foot contour	0-5 foot contour	5-10 foot contour	10-15 foot contour	0-5 foot contour	5-10 foot contour	10-15 foot contour	15-20 foot contour	0-5 foot contour	5-10 foot contour	10-15 foot contour	15-20 foot contour	20-25 foot contour
<10	20	10	10	10	7	3	10	5	3	2	10	4	3	2	1
10-49	30	20	10	10	10	10	10	10	7	3	10	10	5	3	2
50-99	40	30	10	17	13	10	10	10	10	10	10	10	10	7	3
100-199	50	40	10	23	17	10	14	14	12	10	10	10	10	10	10
200-299	60	50	10	30	20	10	18	16	16	10	14	12	12	12	10
300-399	70	60	10	37	23	10	22	20	18	10	17	15	14	14	10
400-499	80	70	10	43	27	10	25	23	22	10	19	18	17	16	10
500-799	90	80	10	50	30	10	29	27	24	10	22	21	19	18	10
>=800	100	90	10	57	33	10	33	31	26	10	25	23	22	20	10

Syracuse Lake is classified as mesotrophic and has 414 surface acres. Based on these characteristics, 80 sites were chosen for sampling. These sites were divided between each 5-foot depth contour, from the 0-5 foot contour, to the 15-20 foot depth contour.

8.2.1 Tier I Results

Tier I surveys took place on May 18 and August 9 of 2006. Results of these surveys were used to construct figure 2, showing the major plant beds in Syracuse Lake. The submersed plant community of Syracuse Lake covers roughly 124 acres of the lake, or 30% of the lake's total surface area. Chara is by far the most dominant plant in Syracuse Lake and is present in most areas where water depth is 5 feet or below. Eurasian watermilfoil is also fairly abundant in the lake, and has patchy distribution throughout the lake, although it is the dominant plant in select areas.

During the 2006 Tier I surveys, 5 major plant beds were identified. The composition of these plant beds show slight changes from spring to August. Eelgrass becomes much more prevalent in the August, and observations from homeowners indicate that it was especially heavy in August of 2006. Curly leaf pondweed drops out of many plant beds as water temperatures rise, and Eurasian watermilfoil usually becomes more prevalent in Syracuse Lake later in the growing season.

Problem Plant Areas:

Although Eurasian watermilfoil is present throughout the lake, it forms dense beds along drop-offs in 8-17 feet of water. These thick areas will continue to be the targets of herbicide treatments. Exact treatment areas will depend on the results of the spring 2007 aquatic vegetation survey, but the open water area 200 feet offshore from Medusa Drive is a likely candidate for herbicide treatment in 2007.

Beneficial Plant Areas:

One of the most beneficial plant areas in Syracuse Lake is the wetland in the southeast end of the lake. This area will continue to be treated for purple loosestrife in 2007. Residents noticed a reduction in the amount of purple loosestrife present in 2006, which is encouraging. Reducing purple loosestrife infestation will help to maintain a healthy wetland community that should help protect water quality in Syracuse Lake.

Figure 2 shows the locations and acreages for the major plant beds in Syracuse Lake.

Figure 2: Syracuse Lake 2006 Major Plant Beds

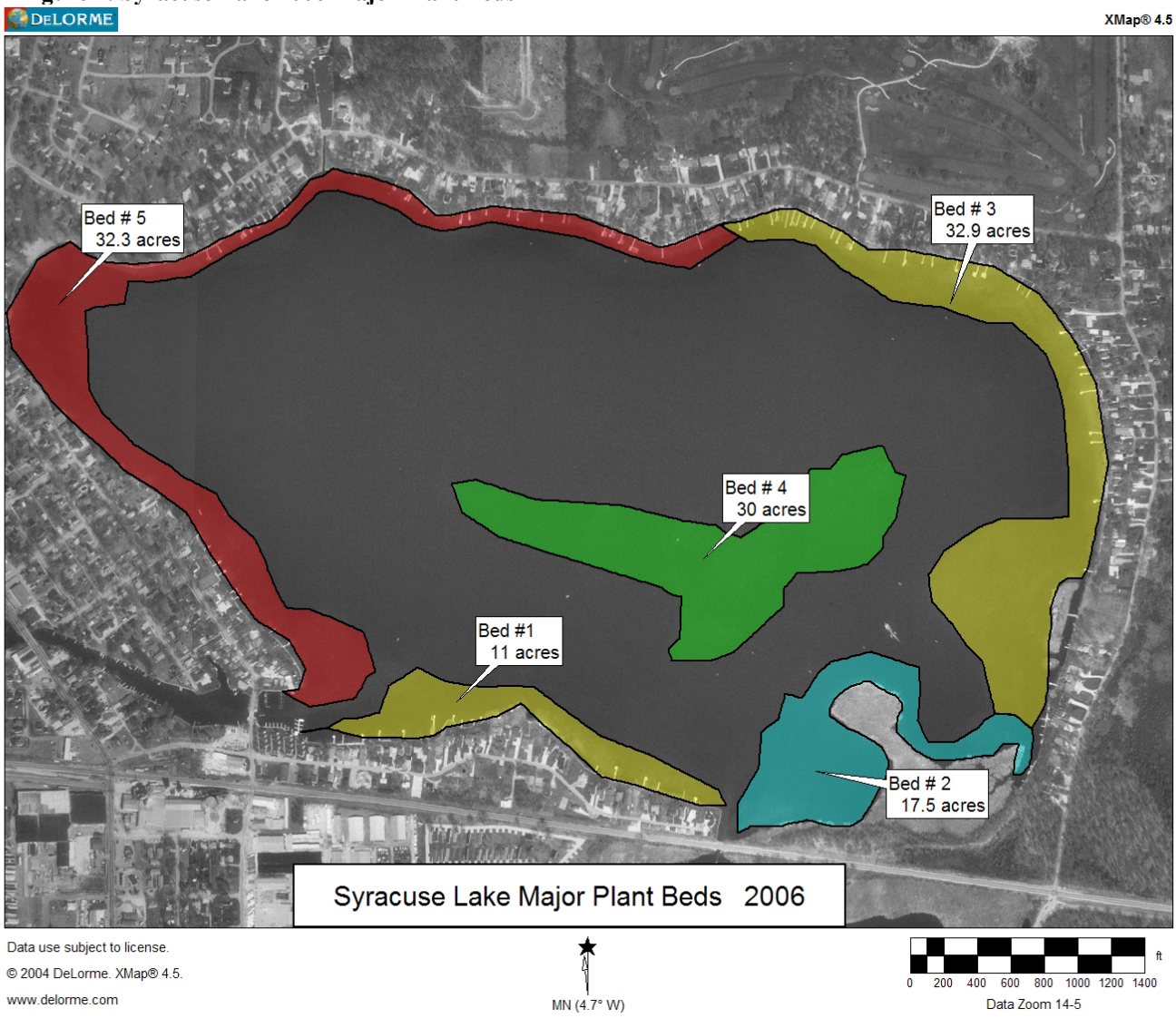


Table 5 shows all of the plant species found in the Tier I surveys and there abundance rating for each plant bed. Blanks indicated that the plant was not present in a particular bed.

Table 5: Tier I Plant Bed Summary

Syracuse Lake 2006 Tier I Submersed Plants

Species Abundance by Plant Bed #

	#1	#2	#3	#4	#5
Plant Species					
American Pondweed		2			
Bladderwort	1	2	2	2	2
Chara	4	3	3		2
Eelgrass		1			
Illinois Pondweed	1	1	1		2
Eurasian Milfoil				3	3
Flat-stemmed Pondweed					1
Northern Watermilfoil					1
Sago Pondweed	1	1	1	1	1
Curly-Leaf Pondweed			1		1
Coontail		1		2	2
Total # of Species	**4**	**7**	**5**	**4**	**9**
Size (Acres)	*11*	*17.5*	*32.9*	*30*	*32.3*

Plant Bed #1
Size: 11 acres
Substrate: Sand/Gravel
Number of Species: 4
Description: This plant bed covers much of the southwest shoreline of Syracuse Lake. Chara is the dominant species in this plant bed, covering over 60 % of the bed. Bladderwort, Sago pondweed and Illinois pondweed were also present in lower abundances.

Plant Bed #2
Size: 17.5 acres
Substrate: Sand/Silt
Number of Species: 7
Description: This plant bed surrounds the wetland area in the southeast corner of the lake. It was the second most diverse plant bed in the Tier I survey containing 7 species. Chara was again the most dominant species in the plant bed. American pondweed and bladderwort were both present with abundances around 20 % and eelgrass, Illinois pondweed, sago pondweed and coontail were all present in low abundance.

Plant Bed #3
Size: 32.9 acres
Substrate: Sand/Gravel
Number of Species: 5
Description: This large plant bed, located on the eastern side of the lake has a very sandy bottom, which prevents excessive plant growth. Chara is the major species in this bed with about 60% coverage. Bladderwort was also fairly common in this bed, though its distribution was patchy. Illinois pondweed, sago pondweed, and curly leaf pondweed were also present in this bed in low abundance.

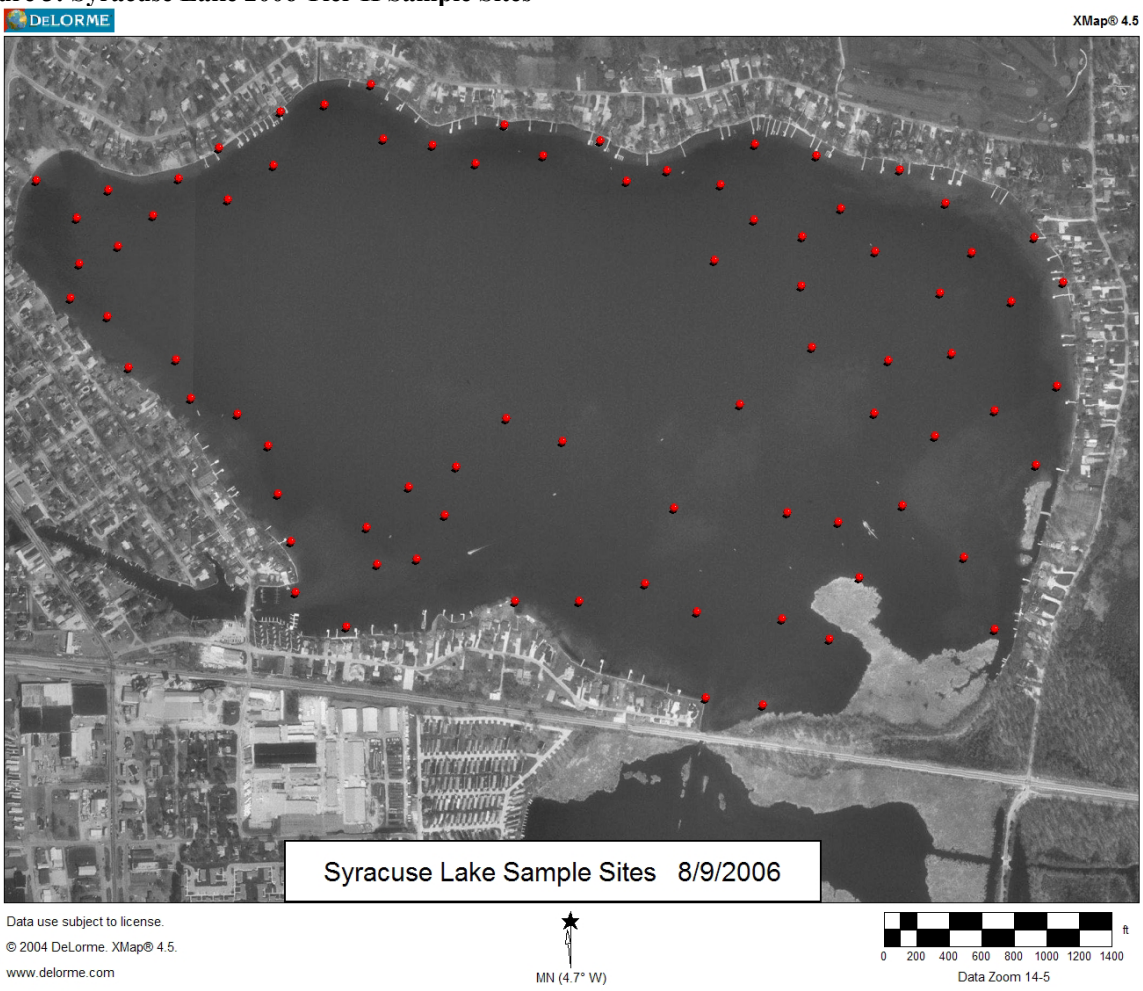
Plant Bed #4
Size: 30 acres
Substrate: Silt/Sand
Number of Species: 4
Description: This offshore plant bed contains more organic matter than the near shore bed and tends to grow more aquatic vegetation. Eurasian watermilfoil is common in this bed and is very thick in some areas, although it is more commonly mixed with native plants. Bladderwort and coontail showed much the same distribution as Eurasian watermilfoil, although they did not form the dense patches that Eurasian watermilfoil did. Sago pondweed was present in this bed in lower abundance.

Plant Bed #5
Size: 32.3 acres
Substrate: Sand/Silt
Number of Species: 9
Description: This large plant bed is the most diverse bed in the lake containing 9 species of plants. Eurasian watermilfoil was fairly abundant in this bed in spring of 2006 though it was very scarce during the August 2006 survey, which took place after the herbicide treatments. Bladderwort, Illinois pondweed, and coontail were found in moderate abundance in the deeper water of this bed, while chara dominated areas with depths of less than 5 feet. Flat-stemmed pondweed, northern watermilfoil sago pondweed, and curly leaf pondweed were also present in low abundance.

8.2.2 Tier II Results

Secchi depth was estimated at 9.0 feet in the August 2006 Tier II survey. Eighty rake samples were distributed throughout each 5 foot depth contour of the littoral zone. A total of 16 species of submersed aquatic plants were collected during this survey, with 14 of the 16 species being native plants. The following map shows the locations of all sample sites during the 2006 Tier II survey. Sample sites differ from 2005, reflecting the change in Tier II protocol for 2006.

Figure 3: Syracuse Lake 2006 Tier II Sample Sites



August Data Analysis

Tables 6 through 10 are data summaries for the 2006 Tier II aquatic vegetation survey. These tables help to describe the plant community, and will help identify any changes that take place in the years to come. Table 6 includes every sample site, and the other reports describe each five foot depth contour of the lake's littoral zone (0-5 feet, 5-10 feet, etc).

Table 6: August 2006 Data Analysis: all sites

Occurrence and Abundance of Submersed Aquatic Plants

Date:	8/9/06	Littoral sites with plants:	66	Species diversity:	0.89
Littoral depth (ft):	20.0	Number of species:	16	Native diversity:	0.88
Littoral sites:	80	Maximum species/site:	7	Rake diversity:	0.86
Total sites:	80	Mean number species/site:	2.05	Native rake diversity:	0.83
Secchi:	9.0	Mean native species/site:	1.83	*Mean rake score:	3.03

Common Name	Site frequency	Rel. Freq.	Relative density	Mean density	Dominance
Chara	43.8	21.5	1.24	2.83	24.8
Bladderwort	22.5	11.0	0.35	1.56	7.0
Eurasian Watermilfoil	21.3	10.4	0.54	2.53	10.8
Sago Pondweed	20.0	9.8	0.43	2.13	8.5
Illinois Pondweed	18.8	9.2	0.26	1.40	5.3
Coontail	16.3	8.0	0.31	1.92	6.3
Eel Grass	15.0	7.4	0.28	1.83	5.5
Slender Naiad	13.8	6.7	0.21	1.55	4.3
Richardson's Pondweed	12.5	6.1	0.20	1.60	4.0
Leafy Pondweed	6.3	3.1	0.06	1.00	1.3
Brittle Naiad	5.0	2.5	0.13	2.50	2.5
Whorled Watermilfoil	3.8	1.8	0.09	2.33	1.8
American Pondweed	1.3	0.6	0.01	1.00	0.3
Curly-leaf Pondweed	1.3	0.6	0.01	1.00	0.3
Flat-stemmed Pondweed	1.3	0.6	0.01	1.00	0.3
Northern Watermilfoil	1.3	0.6	0.03	2.00	0.5

Table 7: August 2006 Data Analysis: 0-5 foot depth Contour

Occurrence and Abundance of Submersed Aquatic Plants

Date:	8/9/06	Littoral sites with plants:	24	Species diversity:	0.80
Littoral depth (ft):	5.0	Number of species:	12	Native diversity:	0.80
Littoral sites:	25	Maximum species/site:	5	Rake diversity:	0.63
Total sites:	25	Mean number species/site:	2.32	Native rake diversity:	0.63
Secchi:	9.0	Mean native species/site:	2.32	*Mean rake score:	3.36

Common Name	Site frequency	Relative density	Mean density	Dominance
Chara	84.0	2.76	3.29	55.2
Bladderwort	36.0	0.52	1.44	10.4
Illinois Pondweed	36.0	0.36	1.00	7.2
Richardson's Pondweed	20.0	0.20	1.00	4.0
Slender Naiad	16.0	0.24	1.50	4.8
Sago Pondweed	12.0	0.36	3.00	7.2
Eel Grass	8.0	0.08	1.00	1.6
American Pondweed	4.0	0.04	1.00	0.8
Coontail	4.0	0.04	1.00	0.8
Leafy Pondweed	4.0	0.04	1.00	0.8
Northern Watermilfoil	4.0	0.04	1.00	0.8
Whorled Watermilfoil	4.0	0.04	1.00	0.8

Table 8: August 2006 Data Analysis: 5-10 Foot Depth Contour

Date:	8/9/06	Littoral sites with plants:	22	Species diversity:	0.89
Littoral depth (ft):	10.0	Number of species:	14	Native diversity:	0.88
Littoral sites:	23	Maximum species/site:	7	Rake diversity:	0.88
Total sites:	23	Mean number species/site:	2.61	Native rake diversity:	0.86
Secchi:	9.0	Mean native species/site:	2.30	*Mean rake score:	3.65

Common Name	Site frequency	Relative density	Mean density	Dominance
Chara	52.2	1.13	2.17	22.6
Bladderwort	30.4	0.39	1.29	7.8
Sago Pondweed	30.4	0.48	1.57	9.6
Eel Grass	26.1	0.43	1.67	8.7
Eurasian Watermilfoil	26.1	0.87	3.33	17.4
Coontail	21.7	0.48	2.20	9.6
Illinois Pondweed	17.4	0.26	1.50	5.2
Brittle Naiad	13.0	0.22	1.67	4.3
Richardson's Pondweed	13.0	0.22	1.67	4.3
Leafy Pondweed	8.7	0.09	1.00	1.7
Slender Naiad	8.7	0.09	1.00	1.7
Curly-leaf Pondweed	4.3	0.04	1.00	0.9
Flat-stemmed Pondweed	4.3	0.04	1.00	0.9
Whorled Watermilfoil	4.3	0.22	5.00	4.3

Table 9: August 2006 Data Analysis:10-15 foot Depth Contour

Occurrence and Abundance of Submersed Aquatic Plants

Date:	8/9/06	Littoral sites with plants:	16	Species diversity:	0.87
Littoral depth (ft):	15.0	Number of species:	11	Native diversity:	0.87
Littoral sites:	22	Maximum species/site:	6	Rake diversity:	0.87
Total sites:	22	Mean number species/site:	1.86	Native rake diversity:	0.88
Secchi:	9.0	Mean native species/site:	1.41	*Mean rake score:	3.09

Common Name	Site frequency	Relative density	Mean density	Dominance
Eurasian Watermilfoil	45.5	1.00	2.20	20.0
Coontail	27.3	0.45	1.67	9.1
Sago Pondweed	22.7	0.59	2.60	11.8
Slender Naiad	22.7	0.41	1.80	8.2
Eel Grass	18.2	0.45	2.50	9.1
Bladderwort	9.1	0.27	3.00	5.5
Chara	9.1	0.18	2.00	3.6
Richardson's Pondweed	9.1	0.27	3.00	5.5
Illinois Pondweed	9.1	0.27	3.00	5.5
Leafy Pondweed	9.1	0.09	1.00	1.8
Brittle Naiad	4.5	0.23	5.00	4.5

Table 10: August 2006 Data Analysis: 15-20 Foot Depth Contour

Occurrence and Abundance of Submersed Aquatic Plants

Date:	8/9/06	Littoral sites with plants:	4	Species diversity:	0.75
Littoral depth (ft):	20.0	Number of species:	5	Native diversity:	0.67
Littoral sites:	10	Maximum species/site:	1	Rake diversity:	0.73
Total sites:	10	Mean number species/site:	0.50	Native rake diversity:	0.67
Secchi:	9.0	Mean native species/site:	0.40	*Mean rake score:	0.60

Common Name	Site frequency	Relative density	Mean density	Dominance
Coontail	10.0	0.30	3.00	6.0
Eurasian Watermilfoil	10.0	0.10	1.00	2.0
Sago Pondweed	10.0	0.10	1.00	2.0
Whorled Watermilfoil	10.0	0.10	1.00	2.0

The most significant changes observed from the spring survey to the August survey were the increase in eelgrass abundance and the increase in Eurasian watermilfoil abundance in non-treated areas.

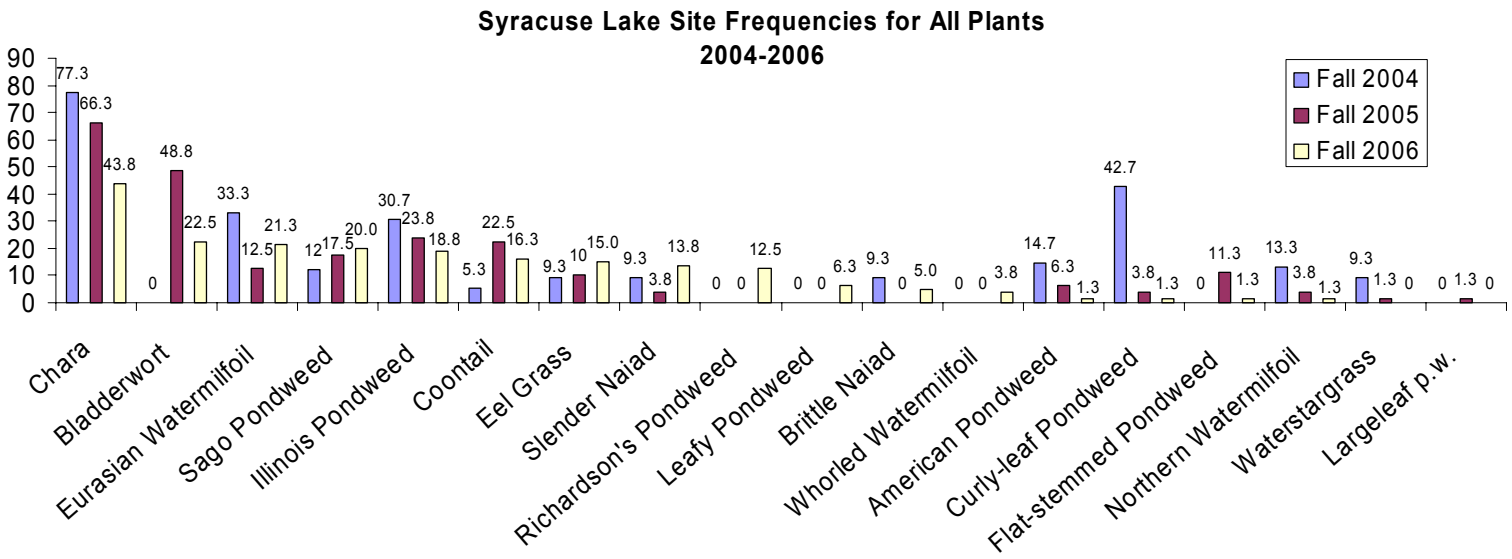
Site Frequency

Site frequency is a measure of how often a species was collected during the Tier II survey. It can be calculated by the following equation:

$$\text{Site Frequency} = \frac{\text{(\# of sites where the species was collected)}}{\text{Total \# of littoral sample sites}} \times 100$$

Table 11 shows site frequencies for every plant collected in any of the late season Tier II surveys since the lake was involved in the LARE program. Eurasian watermilfoil has decreased roughly 12 percentage points since herbicide treatments began, although it showed an increase in site frequency form 2005 to 2006, may be partly due to the change in Tier II protocol. Chara showed a large decrease in sited frequency from 2005 to 2006, which also reflects the change in protocol. Chara normally grows in shallow water, and the new protocol reduces the number of shallow sample sites in each survey.

Table 11: 2004-2006 Site Frequencies



Mean Density and Relative Density

Mean Density is a measure the abundance of a species in areas where it is growing. For example, a species can have a high site frequency, but still have a very low mean density. This means that a species may be prevalent throughout an entire lake, but it may also be sparsely scattered. Mean density can be calculated using the following equation:

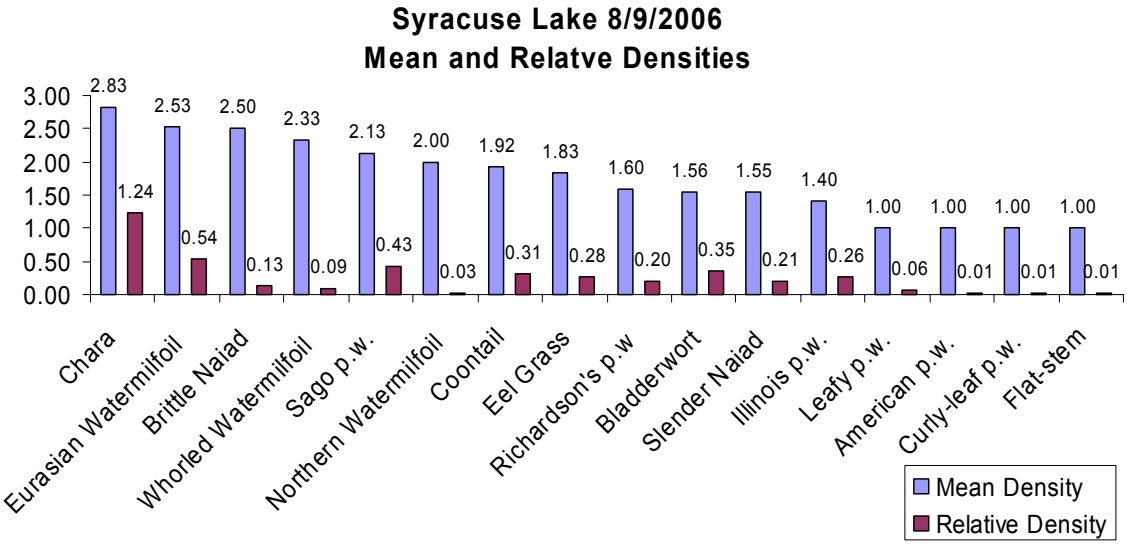
$$\text{Mean Density} = \frac{\text{(The sum of all rake scores for a species)}}{\text{(Total \# of sites where the species was collected)}}$$

Relative Density is calculated much like mean density, only in this case, the sum of the rake scores for a species is divided by the total number of sample sites in the survey. Unless a species was collected at every sample site, the relative density will always be smaller than the mean density.

$$\text{Relative Density} = \frac{\text{(The sum of all rake scores for a species)}}{\text{(Total \# of littoral sample sites)}}$$

Table 12 shows mean and relative densities for each plant found in the August 2006 Tier II survey. Chara had both the highest mean density and the highest relative density. Eurasian watermilfoil had the second highest mean density and the second highest relative density. Brittle naiad was third highest in mean density, but was not frequently collected, giving it a low relative density.

Table 12: August 2006 Mean and Relative Densities



Species Diversity

The species diversity indices listed in tables 6 through 10 help to describe the overall plant community. A species diversity index is actually measured as a value of uncertainty (H). If a species is chosen at random from a collection containing a certain number of species, the diversity index (H) is the probability that a chosen species will be different from the previous random selection. The diversity index (H) will always be between 0 and 1. The higher the H value, the more likely it is that the next species chosen from the collection at random will be different from the previous selection (Smith, 2001). This index is dependent upon species richness and species evenness, meaning that species diversity is a function of how many different species are present and how evenly they are spread throughout the ecosystem.

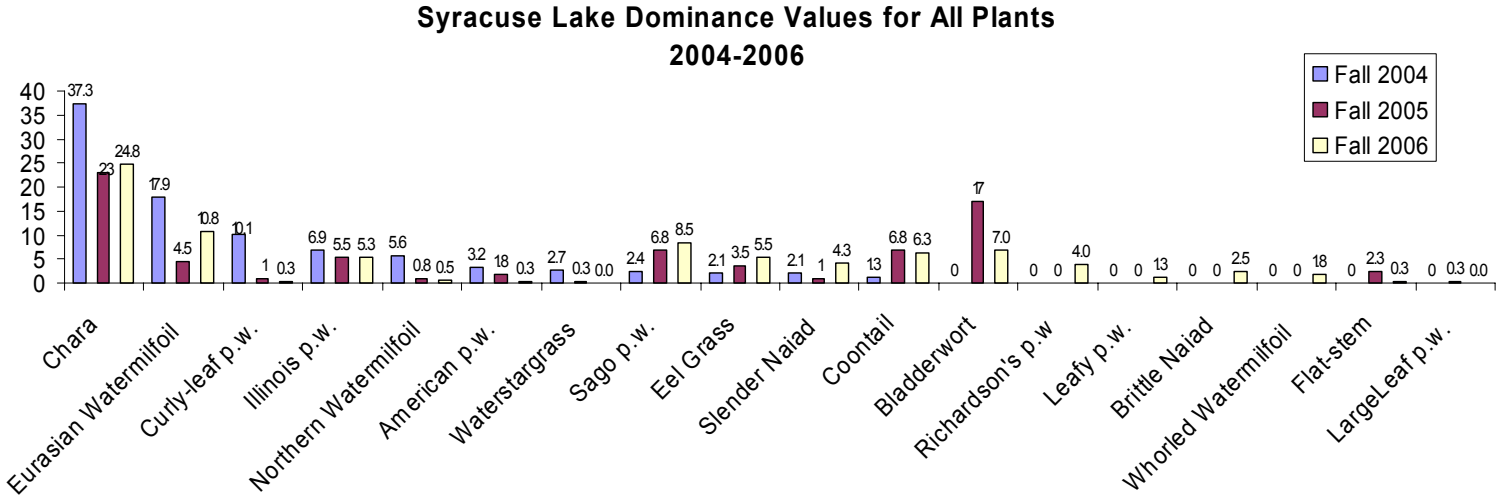
The species diversity index for Syracuse Lake in August of 2006 was 0.89 which is very good. Native plant diversity in August of 2006 was 0.88 which indicates that most species collected in the survey were native plants. Rake diversity was 0.86 and native rake diversity was 0.83.

Species Dominance

Species dominance is dependent upon how many times a species occurs, and its relative coverage area or biomass within the system. In this survey, the abundance rating given to each species at each sample site was used to determine dominance. The dominance of a particular species in this Tier II survey increases as its site frequency and relative abundance increase.

Table 13 tracks dominance values for each plant collected at Syracuse Lake during its involvement in the LARE program. Trends are similar to sight frequency, with Eurasian watermilfoil dominance at about half of its original value, before chemical treatments began.

Table 13: 2004-2006 Plant Dominance



Relative Frequency of Occurrence

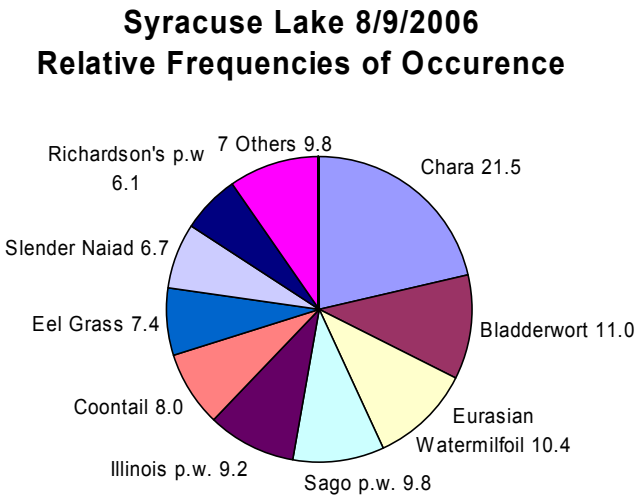
Relative frequency of occurrence is a measure of how often a plant is collected in relation to all of the other plants collected in a Tier II survey. It is demonstrated with the following equation:

$$\text{Relative Freq. of Occurrence} = \frac{\text{The site Frequency for a species} \quad X\ 100}{\text{The sum of all site frequencies including the species in question}}$$

The sum of all relative frequency of occurrence values will always add up to 100. For this reason it is displayed in a pie graph.

Figure 4 shows relative frequency of occurrence values for each plant collected in the August 2006 survey. Chara had by far the greatest relative frequency of occurrence at 21.5. Bladderwort was next at 11.0, followed by Eurasian watermilfoil at 10.4.

Figure 4: August 2006 Frequencies of Occurrence



8.3 Macrophyte Inventory Discussion

The submersed plant community of Syracuse Lake covers roughly 124 acres of the lake, or 30% of the lake's total surface area. This is a large littoral zone when compared to the overall surface area. Eurasian watermilfoil is present throughout the lake and is often dominant in 8-15 feet of water.

The 2006 LARE treatment greatly reduced the Eurasian watermilfoil abundance in plant bed #5 and a portion of plant bed #4, although small but dense patches of milfoil are still scattered throughout the lake. Treatment areas may shift in 2007 to address some of these other areas of infestation. The areas of highest priority have been treated in each of the past two years (plant bed #5), and it is hoped that Eurasian watermilfoil abundance will continue to decline in this area.

One major change observed in the data from spring 2006 to August 2006 was the increase in Eelgrass abundance. This is increase is common due to the lifecycle of the plant, but eelgrass seemed especially abundant in 2006 when compared to past years. Large floating mats of uprooted eelgrass were observed by both the contractor and lake resents late in summer of 2006.

Based upon 2006 survey data, Syracuse Lake has a submersed aquatic plant community with relatively high diversity when compared with many area lakes. Species richness in Syracuse Lake was 16 species in the August of 2006. The plant community is dominated by chara, which is a beneficial, native plant. As more data is collected in the years to come, long term trends can be identified, and the health and diversity of the plant community can be more closely tracked.

In summary, Syracuse Lake is characterized by a submersed plant community with high diversity (0.89), moderate water clarity (secchi depth ~9 ft.) and a fairly wide spread distribution of Eurasian watermilfoil (site frequency 21.3%).

9.0 Aquatic Vegetation Management Alternatives

(See 2004 Lake Management Plan)
Major Eurasian watermilfoil control practices have not changed significantly from the 2004 alternatives.

10.0 Public Involvement

A LARE meeting was held on October 31, 2006 to discuss issues pertaining to Syracuse Lake. District 3 Fisheries Biologist Jed Pearson, lake representatives, Aquatic Weed Control and LARE Aquatic biologist Angela Sturdevant were all present and discussed the plant community of Syracuse Lake.

A public lake meeting was held for Syracuse Lake on October 10, 2006. Jim Donahoe of Aquatic Weed Control summarized LARE management activities and outlined possible treatments that may be necessary to help contain the Eurasian watermilfoil population in the lake.

Public Questionnaires were handed out at the meeting and the results are summarized in the following table. Residents expressed appreciation for funding to treat Syracuse Lake, but also expressed that a whole lake treatment might be the most effective and cost efficient way to treat the lake. Unfortunately, Syracuse Lake is connected to Mud Lake and Lake Wawasee, which also has a population of Eurasian watermilfoil. Heavy boat traffic moving between the 2 lakes would likely cause quick re-infestation following a Sonar treatment.

Table 14: Public Questionnaire Data

Total: 6

Lake Use Survey — Lake name Syracuse Lake

Are you a lake property owner? Yes 6 No 0

Are you currently a member of your lake association? Yes 6 No 0

How many years have you been at the lake?
2 or less - 1
2 – 5 years - 0
5-10 years - 2
Over 10 years - 3

How do you use the lake (mark all that apply)
5 Swimming
6 Boating
3 Fishing
4 Irrigation
0 Drinking water
0 Other _____

Do you have aquatic plants at your shoreline in nuisance quantities? Yes 3 No 3

Do you currently participate in a weed control project on the lake? Yes 5 No 1

Does aquatic vegetation interfere with your use or enjoyment of the lake? Yes 2 No 4

Does the level of vegetation in the lake affect your property values? Yes 2 No 4

Are you in favor of continuing efforts to control vegetation on the lake? Yes 5 No 0

Are you aware that the LARE funds will only apply to work controlling invasive exotic species, and more work may need to be privately funded? Yes 5 No 1

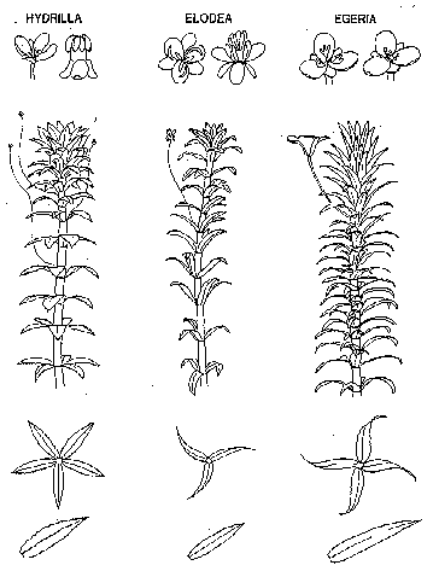
Mark any of these you think are problems on your lake:
3 Too many boats access the lake
1 Use of jet skis on the lake
1 Too much fishing
0 Fish population problem
0 Dredging needed
1 Overuse by nonresidents
1 Too many aquatic plants
0 Not enough aquatic plants
0 Poor water quality
1 Pier/funneling problem

Please add any comments:
2006 problem with eel weeds; I appreciate the positive use of fees I regularly pay.

11.0 Public Education

11.1 Hydrilla

Hydrilla (*Hydrilla verticillata*) is an invasive aquatic plant species common throughout the southern United States. It is listed as a federally noxious weed and causes severe ecological and recreational problems wherever it grows. It is considered to be much more destructive than other invasives like Eurasian watermilfoil and curly leaf pondweed because of its reproductive adaptations. It grows by fragmentation, as does Eurasian watermilfoil, but it also produces turions which can remain dormant in the sediment for 4 years or more (Van and Steward, 1990). It produces tubers at its root tips which can also reproduce after multiple years of dormancy. It can grow 1 inch each day and it quickly out-competes native plants. It forms dense beds that eliminate native plants, stunt fish populations, impede recreation and cause a drastic decrease in biodiversity (Colle and Shireman, 1980). Millions of dollars are spent each year for hydrilla maintenance each year in Florida alone. Eradication is unlikely once a population has been well established, although eradication has been achieved in newly infested waters using a herbicide called Sonar. Sonar is applied at a rate of 6 parts per billion and this concentration is maintained in the water for 180 days. Early detection can be crucial to an effective eradication program, and all lake residents and users are encouraged to be on the look-out for this invader.



In fall of 2006, this plant was found in Lake Manitou, in Rochester, Indiana. This is the first instance of hydrilla in the upper Midwest. Prior to its appearance in Lake Manitou, The closest infestations of hydrilla were in Tennessee and Pennsylvania.

Hydrilla can easily be confused with native elodea. The major difference is that elodea has sets of leaves on the stem in whorls of three, while hydrilla usually has whorls of 5 leaves, although 4 to 9 leaves per whorl are possible with hydrilla. Hydrilla will also have small serrations on the leaf edges. More information on hydrilla can be found at the University of Florida's Center for Aquatic Invasive Plants (http://plants.ifas.ufl.edu/). More general information on aquatic invaders can be found at www.protectyourwaters.net.

12.0 Integrated Management Action Strategy

Approximately 50 acres of Syracuse Lake will be treated again in 2007 using 2, 4-D to provide control of Eurasian watermilfoil. Although Eurasian watermilfoil will not be eliminated from Syracuse Lake, the goal will be to further reduce its population. Exact treatment areas will be dependant upon the results of the spring 2007 visual inspection. Some treatment areas may be shifted if inspections indicate that previously treated areas have shown a significant reduction in Eurasian watermilfoil dominance.

The 2007 management strategies may shift some treatment areas to new locations where Eurasian watermilfoil is becoming more abundant, with the hope that native plants will be colonizing previous treatment areas where the Eurasian watermilfoil population has been reduced. The further reduction of the Eurasian watermilfoil population should continue to help beneficial native plants compete and promote a more diverse plant community that offers better fish habitat and less recreational interference.

The offshore area at least 200 feet from the lake's southern shoreline of the lake is a possible treatment area for 2007. Sample sites taken in deep water showed that very dense stands of Eurasian watermilfoil are present in this area.

Purple loosestrife located in wetland at the southeast end of the lake will also be treated with Renovate. Previous Renovate treatments have shown good results, and the purple loosestrife appears to be decreasing along the shoreline of the lake.

Aquatic vegetation surveys should also take place in 2007 to continue to monitor the populations of both native and invasive species.

13.0 Project Budget

2007 Cost Estimates

2. Chemically treat areas of Eurasian Watermilfoil Infestation

*All cost figures are estimates only. All prices are subject to change pending 2007 chemical pricing.

A.	Treat up to 50 acres of Eurasian milfoil with 2, 4-D	$ 18,000
B.	Treat purple loosestrife in wetland areas	$ 900

3. Conduct a late season Tier II survey to monitor both Eurasian milfoil and native plant populations.

A.	Vegetation Survey and Plan Update	$ 4,000

Survey and planning costs

Four thousand dollars are currently budgeted for surveying and planning but this cost may be reduced, pending 2007 LARE survey and planning requirements.

14.0 Monitoring and Plan Update Procedures

An invasive species distribution map, along with a treatment map will be constructed following a spring 2006 visual survey. A Tier II vegetation survey should also be conducted late in the growing season to evaluate the plant community's response to the 2007 LARE treatments.

15.0 References

Blessing, Arlene. 2004. Fundamentals of Pesticide Use: Indiana Pesticide Applicator Core Training Manual. Purdue University. West Lafayette, Indiana 106 pp.

Cunningham, Willam P., and Saigo, Barwbara W. 2001. Environmental Science: a Global Concern. McGraw Hill Inc. Boston, Massachusetts 646.

Getsinger, Kurt Ph.D. 2005. Aquatic Plant Management: Best Management Practices in Support of Fish and Wildlife Habitat. The Aquatic Ecosystem Restoration Foundation. 78 pp.

IDNR. 2004. Procedure Manual for Surveying Aquatic Vegetation: Tier II Reconnaissance Surveys. IN Department of Natural Resources, Division of Soil Conservation.

IDNR 2004. Procedure manual for surveying Aquatic Vegetation: Tier I and Tier II, Indiana Department of Natural Resources, Indianapolis, Indiana.

Kalff, Jacob. 2002. Limnology: Inland Water Ecosystems. Prentice Hall. Upper Saddle River, New Jersey. 592 pp.

Kannenburg, James R., and Schmidt, James C. 1998. How to Identify and Control Water Weeds and Algae: 5th edition. Applied Biochemists. Milwaukee, Wisconsin. 128pp.

Lembi, Carole 1997. Aquatic Pest Control: Category 5. Department of Botany and Plant Pathology: Purdue University. West Lafayette, Indiana. 58pp.

Pearson, Jed. 2004. A Proposed Sampling Method to Assess Occurrence, Abundance and Distribution of Submersed Aquatic Plants in Indiana Lakes. IN Department of Natural Resources. Division of Fish & Wildlife. Indianapolis, Indiana 37 pp.

Pullman, Douglas G. 1998. The Lake Association Leaders Aquatic Vegetation Management Guidance Manual.

Scribailo, Robin W. Ph.D. & Alix, Mitchell S. 2003. Final Report on the Weevil Release Study for Indiana Lakes. Department of Botany and Plant Pathology. Purdue University. West Lafayette, IN.

Smith, Robert Leo and Smith, Thomas M. 2001. Ecology and Field Biology. Addison Wesley Longman, Inc. San Francisco, California. 771 pp.

Stern, Kinsingly R. 2000. Introductory Plant Biology. McGraw Hill. Madison, Wisconsin. 557 pp.

Tyllia, J. 2000. Northeastern Indiana Fishing Map Guide. Superior, Wisconsin. 184 pp.

16.0 Appendices
16.1 Common Aquatic Plants of Indiana

The following appendix was compiled using information found in the 5th edition of How to Identify Water Weeds and Algae, edited by James C. Schmidt and James R. Kannenberg. All pictures, with the exception of Illinois pondweed and northern milfoil were taken from the Category 5 Aquatic Pest Control Management Manual, written by Dr. Carole Lembi, Head of the Department of Botany and Plant Pathology at Purdue University.

American Pondweed

Scientific name: *Potamogeton americanus*

Classification: Native to Indiana

Distribution: Common throughout the U.S.

Description: American pondweed can be identified by its oval shaped leaves floating on the top of the water. The base of each leaf tapers to a very long petiole that connects the leaf with the stem of the plant. Plant leaves are arranged alternately on the stem and leaves are usually sparsely scattered.

Chara

Scientific name: *Chara sp*.

Classification: Native to Indiana

Distribution: Extremely common worldwide. Usually found in hard water.

Description: Chara is often mistaken for a vascular plant, but it is actually an advanced form of algae. It can be gray, green or yellow in color and is usually forms extremely dense beds that may cover an entire lake. It can be identified by its distinct musky odor and calcium deposits on the algae's surface make it feel bristly to the touch. It possesses leaf-like structures that are whorled around the hollow stem, and it attaches itself to the lake bottom, although it has no actual roots. It usually grows in shallow, clear water.

Coontail

Scientific name: *Ceratophyllum demersum*

Classification: Native to Indiana

Distribution: Common throughout the U.S., usually in hard water.

Description: Coontail plants are submersed and have no roots, though they appear to be attached to the lake bottom when viewed from above the surface of the water. The free-floating nature of coontail allows it to colonize new areas of a lake quickly, and it often times forms extremely dense weed beds where sufficient light and nutrients are available. Coontail has dark green leaves arranged in whorls around the stem and usually grows in long, bushy strands resembling evergreen trees beneath the surface of the water. Coontail's structure is very similar to Eurasian milfoil but coontail has forked leaves, which distinguishes it from the feather-like projections of milfoil leaves.

Curly Leaf Pondweed

Scientific name: *Potamogeton crispus*

Classification: Exotic to Indiana

Distribution: Found throughout the U.S. in fresh and brackish water.

Description: Curly leaf pondweed usually grows and spreads rapidly in early spring and begins to dies out by midsummer as water temperatures approach 70 degrees Fahrenheit. Curly leaf has extremely thin, membranous leaves arranged alternately on the stem with small teeth-like projections visible along the edge of each leaf. A reproductive spike may be seen protruding from the surface of the water. Curly leaf pondweed may also leave small reproductive structures called turions in the sediment on the lake bottom that can lie dormant throughout the winter and then sprout when spring arrives.

Eel Grass (Wild Celery)

Scientific name: *Vallisneria Americana*

Classification: Native to Indiana

Distribution: Found from the Great Plains to the East Coast of the U.S.

Description: Eel grass has tufts of ribbon-like leaves with a horizontal stem embedded in the sediment connecting each tuft. This native plant grows thick weed beds anchored in the mud by roots. These dense beds often shade out other forms of weeds and provide excellent escape cover for small fish. The flowers of this plant are visible in late summer and sit on the top of a coiled structure protruding to the surface. This plant is found in both lakes and river, but is seldom found in stagnant systems. It is considered an extremely valuable plant to aquatic ecosystems.

Elodea

Scientific Name: *Elodea Canadensis*

Classification: Native to Indiana

Distribution: Common throughout the north and north central united states. Its ranges extends as far south as northern Tennnessee.

Description: Elodea grows in long strands resembling milfoil, but its leaves are broad and oval shaped. Leaves are arranged in whorls with three leaves usually occurring at each node. Leaves near the tip of the plant are closely packed together, with the distance between nodes increasing further down the stem.

Eurasian Milfoil

Scientific Name: *Microphyllum spicatum*

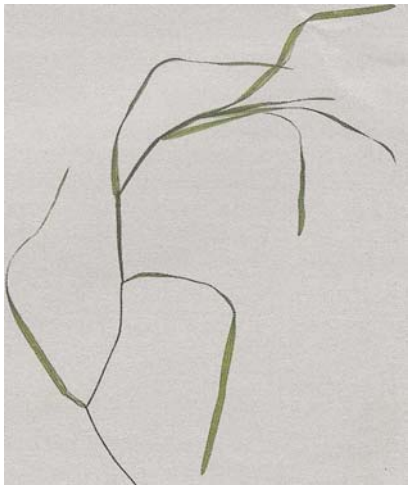
Classification: Exotic in Indiana

Distribution: Common in the Midwest and Eastern U.S. Also spreading along the Pacific coast

Description: This extremely aggressive and extremely destructive plant has leaves in whorls of 4 around a reddish stalk. This plant grows rapidly and can reach lengths of over 10 feet. This plant has the ability to over winter, meaning it can lie dormant during the winter months instead of dying out completely each year. This gives it a distinct advantage over many native species, as it competes for sunlight in early spring. The dormant milfoil plants reach the surface much faster than the native plants sprouting from the lake bottom. This enables the Eurasian milfoil to shade out other plants and form the dense beds that choke the littoral zone of many lakes.

A reproductive process called fragmentation aids the rapid dispersion of Eurasian milfoil. If a milfoil plant is damaged and some fragments are removed from the macrophyte, each small piece of the plant has the ability to grow roots and create a new milfoil plant. Eurasian milfoil is considered one of the most dangerous aquatic nuisance species because of its ability to rapidly disrupt and destroy lake ecosystems.

Flat-stemmed Pondweed



Scientific Name: *Potamogeton zosteriformis*

Classification: Native to Indiana

Distribution: Common throughout the northern half of the U.S.

Description: the most noticeable characteristic is the large, very flat stem. It cannot be rolled between the fingers easily. The ribbon-like leaves extend from the stem toward the surface of the water.

Illinois Pondweed

Scientific name: *Potamogeton illinoensis*

Classification: Native to Indiana

Distribution: Very widespread and very common throughout the upper Midwest and the U.S

Description: Illinois pondweed is common in Indiana, especially in the northern third of the state. This leafy weed has leaves with very broad bases that extend three-fourths of the way around the stem. The upper part of its slender stem is usually branched and very leafy.

www.wvu.edu

Large Leaf Pondweed

Scientific name*:* *Potamogeton amplifolius*
Classification: Native to Indiana
Distribution: Common throughout the upper Midwest and the northern United States in hard water.

Description: This plant has both submersed and floating leaves. The floating leaves are oval shaped and are similar to those of American pondweed. Submersed leaves are arranged alternately with each leaf becoming extremely narrow as it nears the stem of the plant. Mineral deposits on its leaves often give large leaf pondweed a dark brown appearance.

Naiad

Scientific name: *Najas minor* (brittle naiad)

Classification: Native to Indiana

Distribution: Common throughout the U.S.

Description: The leaves of naiad plants are usually widest at the base and gradually become thinner near the tip of the leaf. Plants are extremely leafy and appear bush-like when viewed from above the surface of the water. Many species of naiad are very common in this area. Plant structure often resembles chara, but the absence of calcium deposits on the surface of the plant help in identification. The leaves of brittle naiad have multiple spines along the margins that are visible to the naked eye.

Nitella

Scientific name: *Nitella sp.*

Classification: Native to Indiana

Distribution: Found worldwide, usually in hard water.

Description: Nitella is very similar to chara, and it is also an advanced form of algae. It has leaf-like projections that are whorled around the stem. It is often found growing in very thick patches, usually in shallow, clear water.

Northern Milfoil

Scientific name: *Myriophyllum sibericum*

Classification: Native to Indiana

Distribution: Found throughout the northern half of the U.S. and also in Europe and Western Asia

www.io.uwinnipeg.ca

Description: Northern milfoil has submersed, feather-like, whorled leaves that closely resemble the leaves of Eurasian milfoil. Distinguishing the native northern milfoil from Eurasian milfoil can be difficult. The leaflet pairs of northern milfoil are generally fewer and more widely spaced than those of Eurasian milfoil. This plant is known to hybridize with Eurasian milfoil, and at times, chemical analysis is necessary to distinguish between the two plants.

Sago Pondweed

Scientific name: *Potemogeton pectinatus*

Classification: Native to Indiana

Distribution: Found throughout the U.S., Common in the northern 2/3 of Indiana.

Description: Sago Pondweed has a bushy appearance with narrow, thread-like leaves that spread out to resemble a fan. Leaves are usually 1/16 of an inch wide and 1 to 6 inches long. Nutlets are formed on a string-like structure and protrude from the surface of the water. While sago pondweed can form dense beds, many times it is found in sparse, loosely distributed arrangements.

16.2 Pesticide Use Restrictions Summary:

The following table was produced by Purdue University and included in the Professional Aquatic Applicators Training Manual. It gives a summary of water use restrictions on all major chemicals available for use in the aquatics market.

Table 15: Pesticide Use Restrictions

Table 1. Aquatic Herbicides and Their Use Restrictions. Always check the label because these restrictions are subject to change.

	Human			Animal	Irrigation		
	Drinking	Swimming	Fish Consumption	Drinking	Turf	Forage	Food Crops
	waiting period, in days						
Copper Chelate	0	0[a]	0	0	0	0	0
Copper Sulfate	0	0[a]	0	0	0	0	0
Diquat	1–3	0[a]	0	1	1–3	1–3	5
Endothall (granular)[b]	7	0[a]	3	0	7	7	7
Endothall (liquid)[b]	7–25	0[a]	3	7–25	7–25[d]	7–25	7–25
Endothall 191 (granular)[c]	7–25	0[a]	3	7–25	7–25	7–25	7–25
Endothall 191 (liquid)[c]	7–25	0[a]	3	7–25	7–25	7–25	7–25
Fluridone	0[e]	0[a]	0	0	7–30	7–30	7–30
Glyphosate	0[e]	0[a]	0	0	0	0	0
2,4-D (granular)	*	0[a]	0	*	*	*	*

[a]Although this compound has no waiting period for swimming, it is always advisable to wait 24 hours before permitting swimming in the direct area of treatment.

[b]Trade name is Aquathol®.

[c]Trade name is Hydrothol®.

[d]May be used for sprinkling bent grass immediately.

[e]Do not apply this product within 1/4 (fluridone) to 1/2 (glyphosate) mile upstream of potable water intakes.

*Do not use treated water for domestic purposes, livestock watering (2,4-D, dairy animals only), or irrigation.

16.3 Resources for Aquatic Management

In addition to the LARE Program, there are many other sources of potential funding to help improve the quality of Indiana Lakes. Many government agencies assist in projects designed to improve environmental quality.

The USDA has many programs to assist environmental improvement. More information on the following programs can be found at www.usda.gov.

Watershed Protection and Flood Prevention Program (USDA

Conservation Reserve Program (USDA)

Wetlands Reserve Program (USDA)

Grassland Reserve Program (USDA)

Wildlife Habitat Incentive Program (USDA)

Small Watershed Rehabilitation Program (USDA)

The following programs are offered by the U.S. Fish and Wildlife Service. More information about the Fish and Wildlife service can be found at www.fws.gov

Partners for Fish and Wildlife Program (U.S. Fish and Wildlife Service)

Bring Back the Natives Program (U.S. Fish and Wildlife Service)

Native Plant Conservation Program (U.S. Fish and Wildlife Service)

The Environmental Protection Agency, the Indiana Department of Environmental Management, and the U.S. Forest Service also have numerous programs for funding. A few of these are listed below. More information can be found at www.in.gov/idem and www.fs.fed.us/

U.S. Environmental Protection Agency Environmental Education Program (EPA)

NPDES Related State Program Grants (IDEM)

Community Forestry Grant Program (U.S. Forest Service)

16.4 State Regulations for Aquatic Plant Management

The following information is found on the IDNR website and outlines general regulations for the management of aquatic plants in public waters.

AQUATIC PLANT CONTROL PERMIT REGULATIONS
Indiana Department of Natural Resources

Note: In addition to a permit from IDNR, public water supplies cannot be treated without prior written approval from the IDEM Drinking Water Section. **Amended state statute adds biological and mechanical control (use of weed harvesters) to the permit requirements, reduces the area allowed for treatment without a permit to 625 sq ft, and updates the reference to IDEM.** *These changes become effective on July 1, 2002.*

Chapter 9. Regulation of Fishing
IC 14-22-9-10

Sec. 10. (a) This section does not apply to the following:
(1) A privately owned lake, farm pond, or public or private drainage ditch.
(2) A landowner or tenant adjacent to public waters or boundary waters of the state, who chemically, mechanically, or physically controls aquatic vegetation in the immediate vicinity of a boat landing or bathing beach on or adjacent to the real property of the landowner or tenant if the following conditions exist:
(A) The area where vegetation is to be controlled does not exceed:
(i) twenty-five (25) feet along the legally established, average, or normal shoreline;
(ii) a water depth of six (6) feet; and
(iii) a total surface area of six hundred twenty-five (625) square feet.
(B) Control of vegetation does not occur in a public waterway of the state.
(b) A person may not chemically, mechanically, physically, or biologically control aquatic vegetation in the public waters or boundary waters of the state without a permit issued by the department. All procedures to control aquatic vegetation under this section shall be conducted in accordance with rules adopted by the department under IC 4-22-2.
(c) Upon receipt of an application for a permit to control aquatic vegetation and the payment of a fee of five dollars ($5), the department may issue a permit to the applicant. However, if the aquatic vegetation proposed to be controlled is present in a public water supply, the department may not, without prior written approval from the department of environmental management, approve a permit for control of the aquatic vegetation.
(d) This section does not do any of the following:
(1) Act as a bar to a suit or cause of action by a person or governmental agency.
(2) Relieve the permittee from liability, rules, restrictions, or permits that may be required of the permittee by any other governmental agency.
(3) Affect water pollution control laws (as defined in IC 13-11-2-261) and the rules adopted under water pollution control laws (as defined in IC 13-11-2-261).
As added by P.L.1-1995, SEC.15. Amended by P.L.1-1996, SEC.64.

312 IAC 9-10-3 Aquatic vegetation control permits
Authority: IC 14-22-2-6; IC 14-22-9-10
Affected: IC 14-22-9-10

Sec. 3. (a) Except as provided under IC 14-22-9-10(a), a person shall obtain a permit under this section before applying a substance to waters of this state to seek aquatic vegetation control.
(b) An application for an aquatic vegetation control permit shall be made on a departmental form and must include the following information:
(1) The common name of the plants to be controlled.
(2) The acreage to be treated.
(3) The maximum depth of the water where plants are to be treated.
(4) The name and amount of the chemical to be used.
(c) A permit issued under this section is limited to the terms of the application and to conditions imposed on the permit by the department.
(d) Five (5) days before the application of a substance permitted under this section, the permit

holder must post clearly, visible signs at the treatment area indicating the substance that will be applied and what precautions should be taken.

(e) A permit issued under this section is void if the waters to be treated are supplied to the public by a private company or governmental agency. *(Natural Resources Commission; 312*

16.5 Public Input Questionnaire

Table 16: 2006 Public Questionnaire

Total: 6

Lake Use Survey — Lake name Syracuse Lake

Are you a lake property owner? Yes 6 No 0

Are you currently a member of your lake association? Yes 6 No 0

How many years have you been at the lake?
2 or less – 1
2 – 5 years – 0
5-10 years – 2
Over 10 years – 3

How do you use the lake (mark all that apply)

5 Swimming	4 Irrigation
6 Boating	0 Drinking water
3 Fishing	0 Other _____

Do you have aquatic plants at your shoreline in nuisance quantities? Yes 3 No 3

Do you currently participate in a weed control project on the lake? Yes 5 No 1

Does aquatic vegetation interfere with your use or enjoyment of the lake? Yes 2 No 4

Does the level of vegetation in the lake affect your property values? Yes 2 No 4

Are you in favor of continuing efforts to control vegetation on the lake? Yes 5 No 0

Are you aware that the LARE funds will only apply to work controlling invasive exotic species, and more work may need to be privately funded? Yes 5 No 1

Mark any of these you think are problems on your lake:

3 Too many boats access the lake
1 Use of jet skis on the lake
1 Too much fishing
0 Fish population problem
0 Dredging needed
1 Overuse by nonresidents
1 Too many aquatic plants
0 Not enough aquatic plants
0 Poor water quality
1 Pier/funneling problem

Please add any comments:
2006 problem with eel weeds; I appreciate the positive use of fees I regularly pay.

16.6 Species Distribution Maps

Figure 5: Syracuse Lake American Pondweed

Figure 6: Syracuse Lake Bladderwort

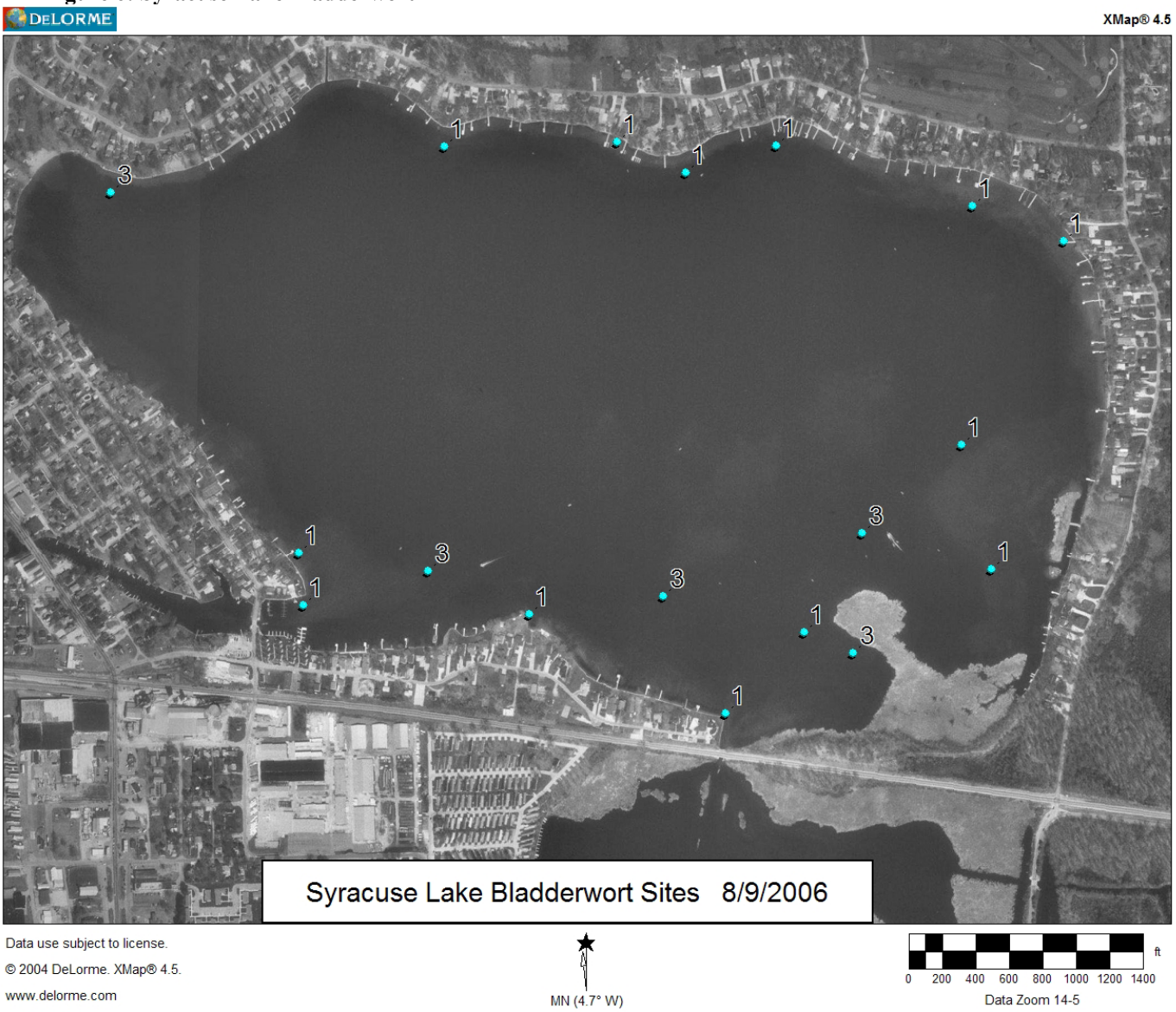


Figure 7: Syracuse Lake Brittle Naiad

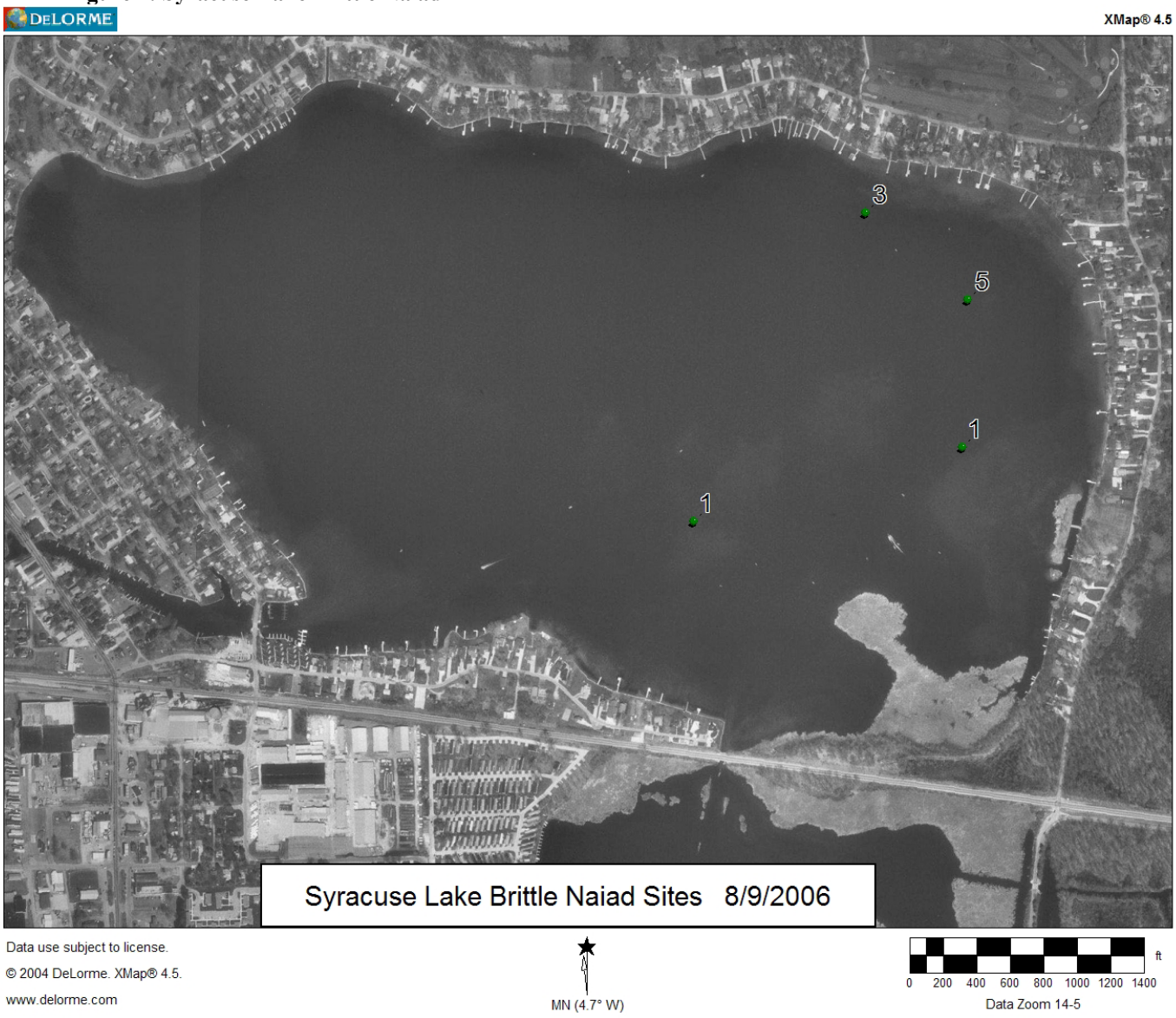


Figure 8: Syracuse Lake Chara

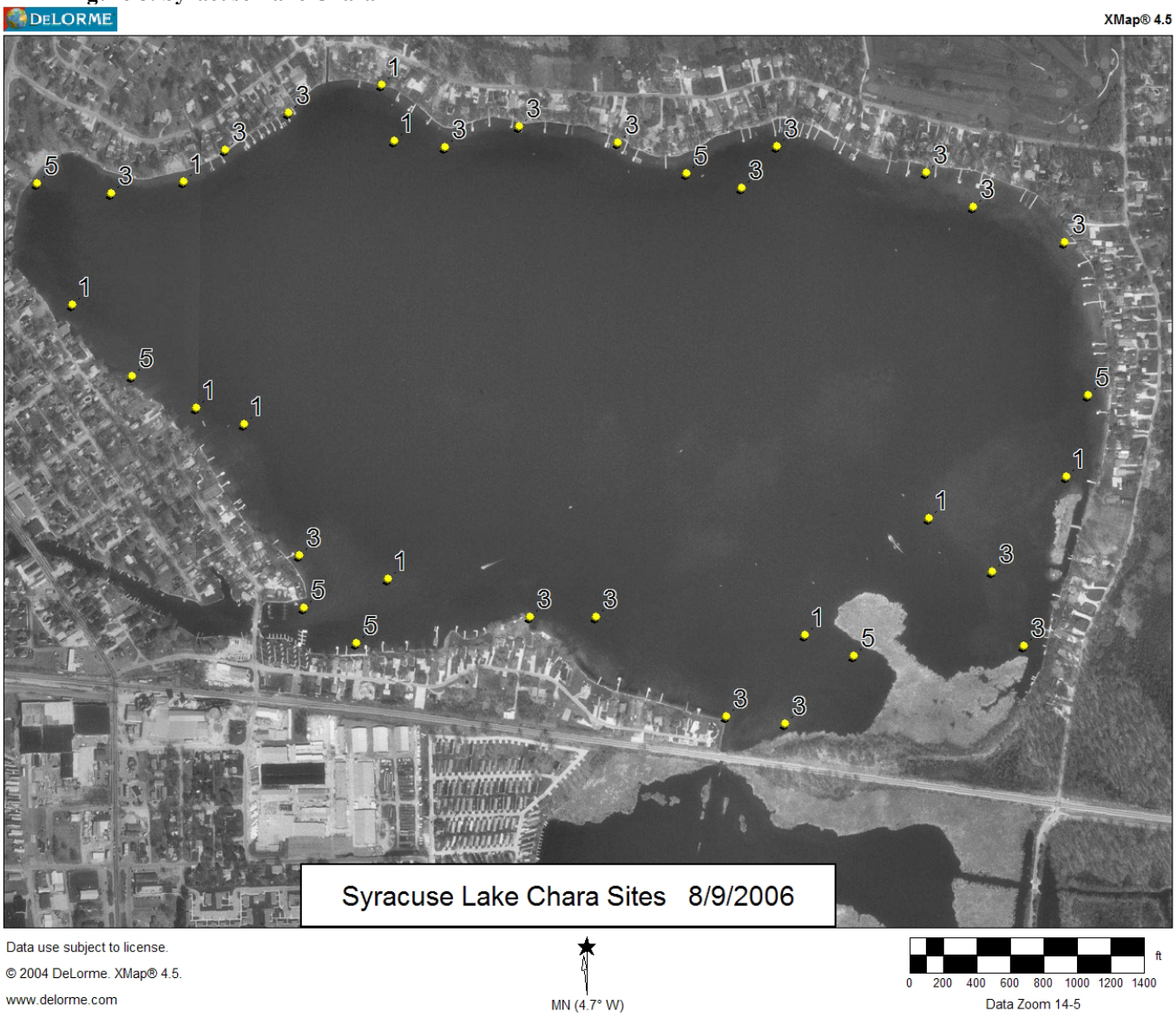


Figure 9: Syracuse Lake Coontail

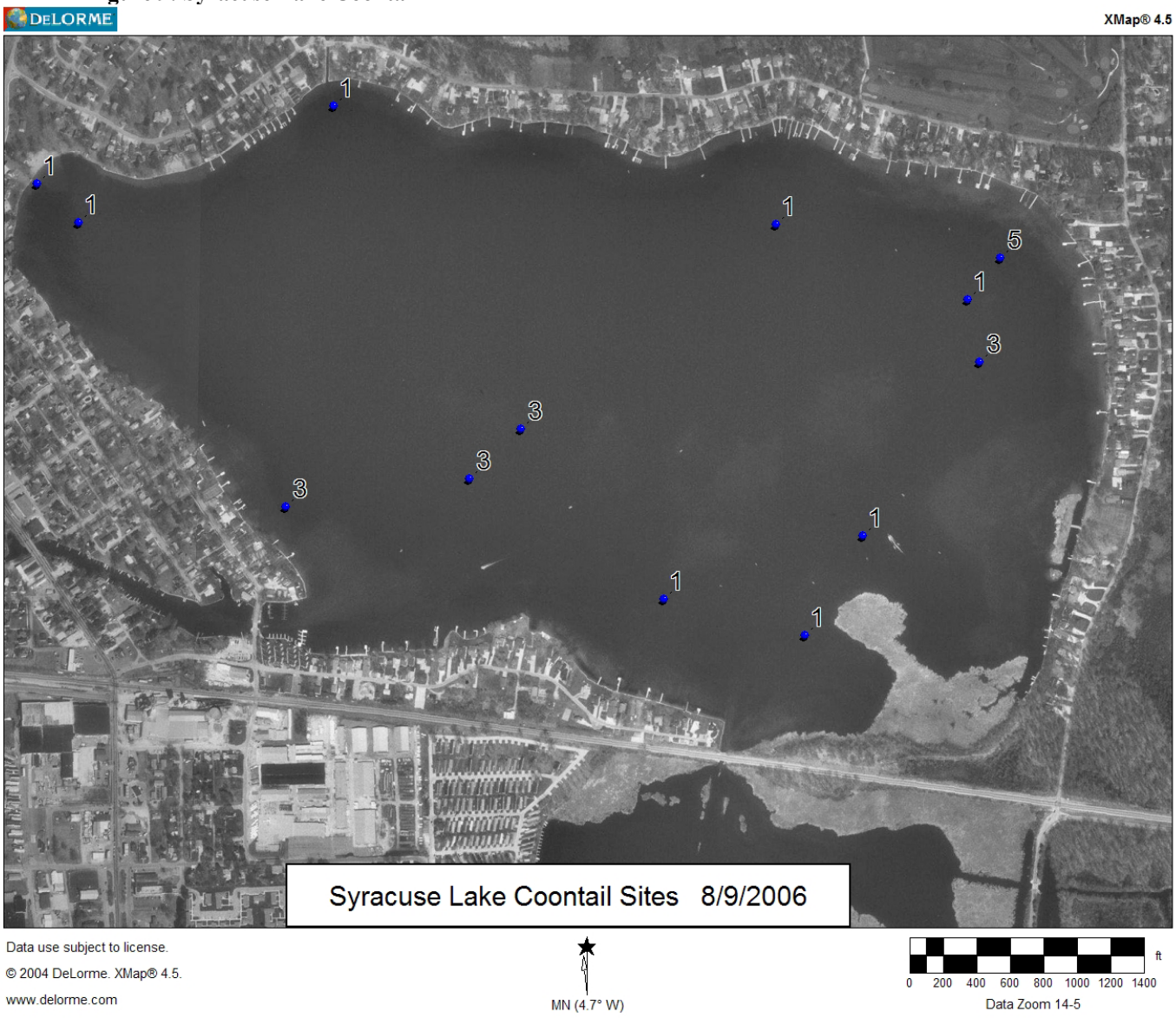


Figure 10: Syracuse Lake Curly Leaf Pondweed

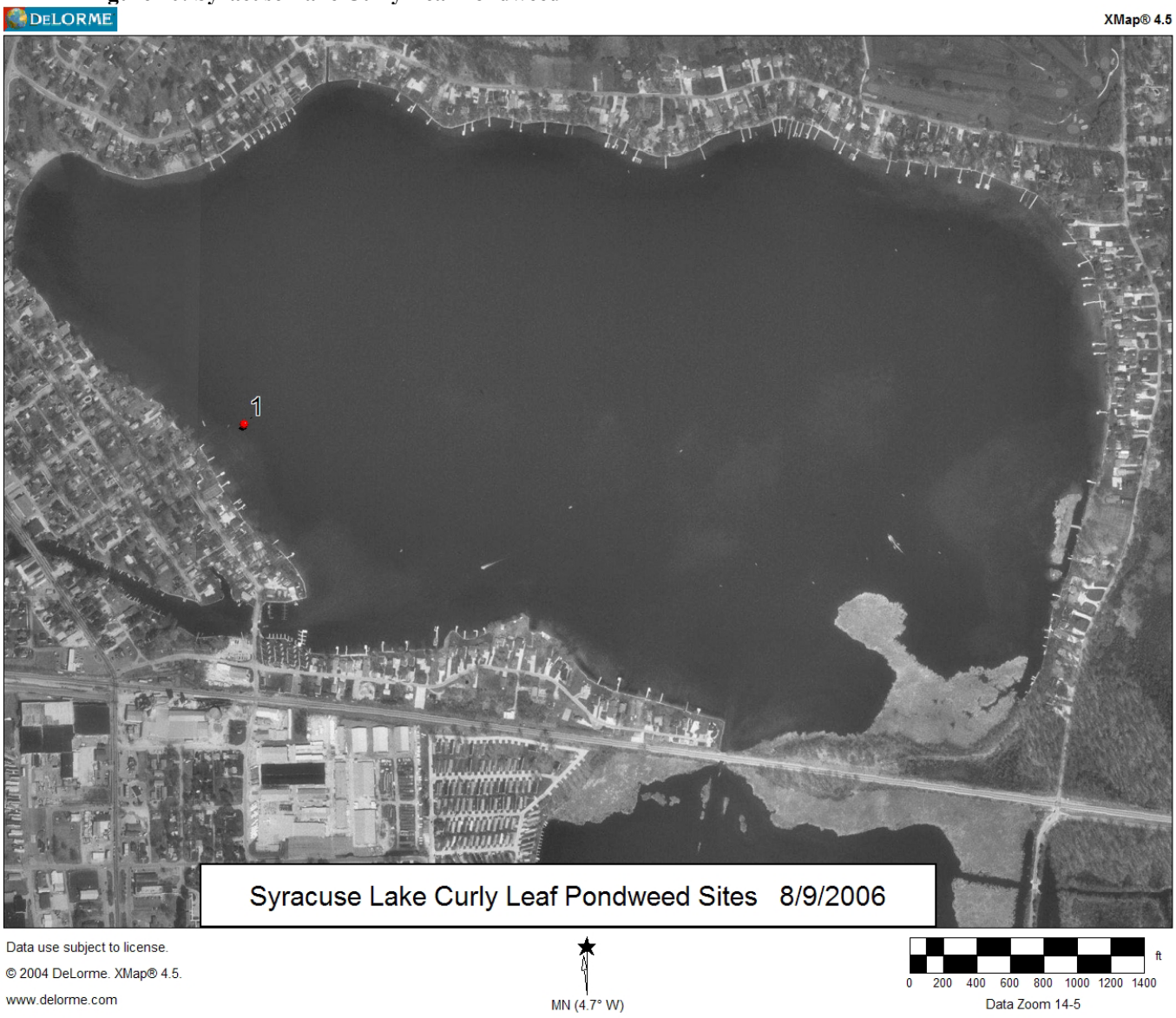


Figure 11: Syracuse Lake Eelgrass

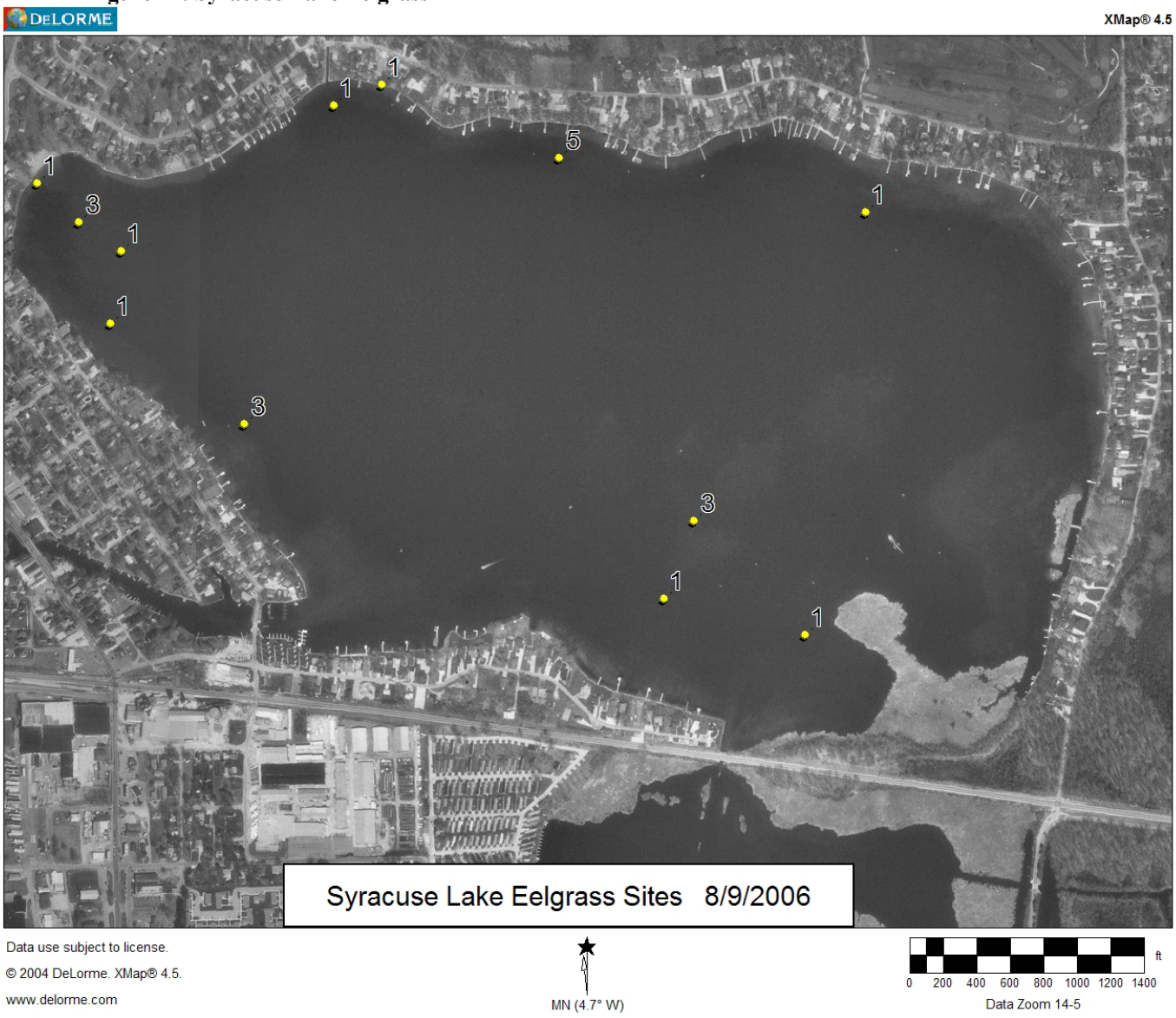


Figure 12: Syracuse Lake Eurasian Watermilfoil

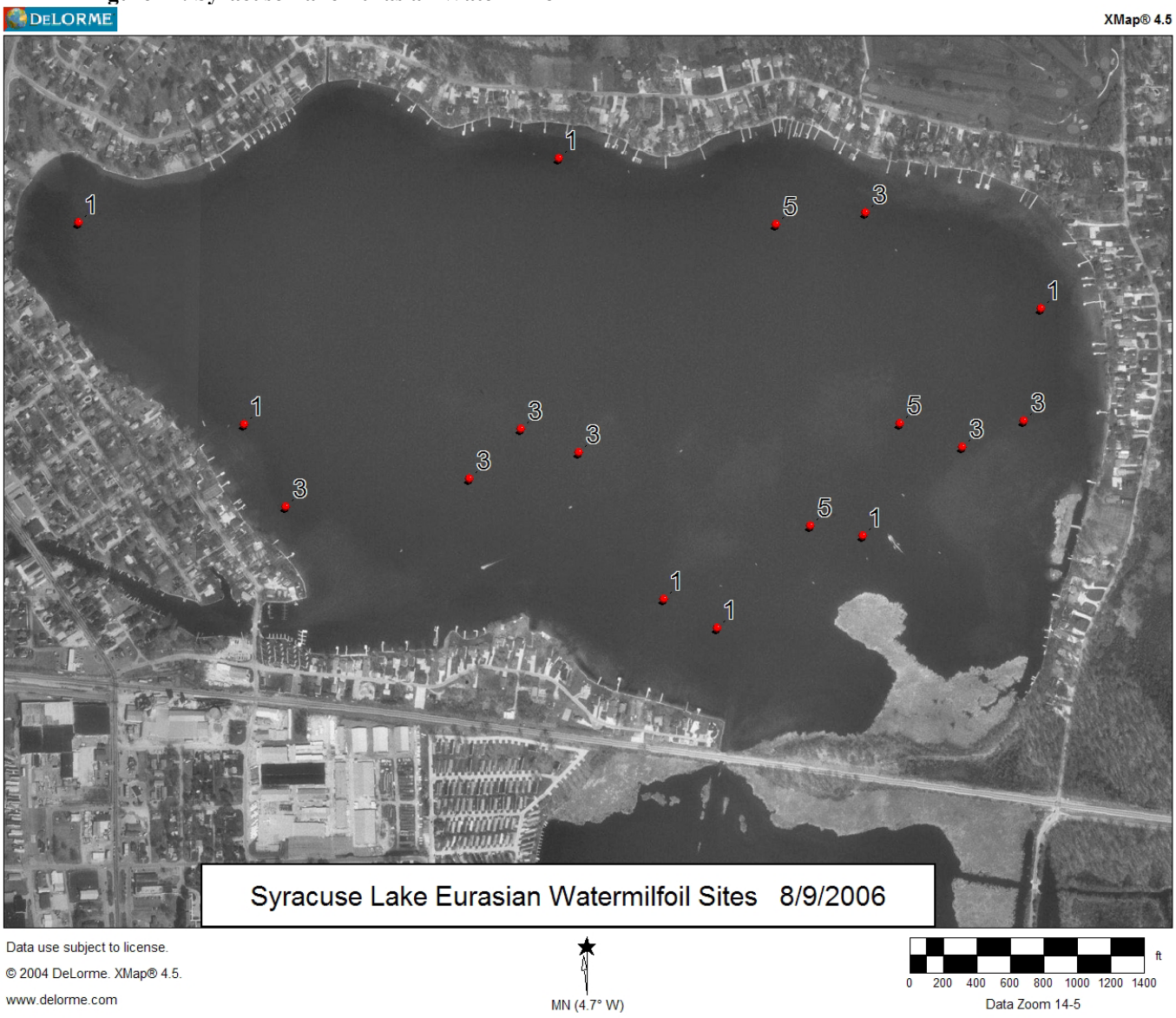


Figure 13: Syracuse Lake Flat-stemmed Pondweed

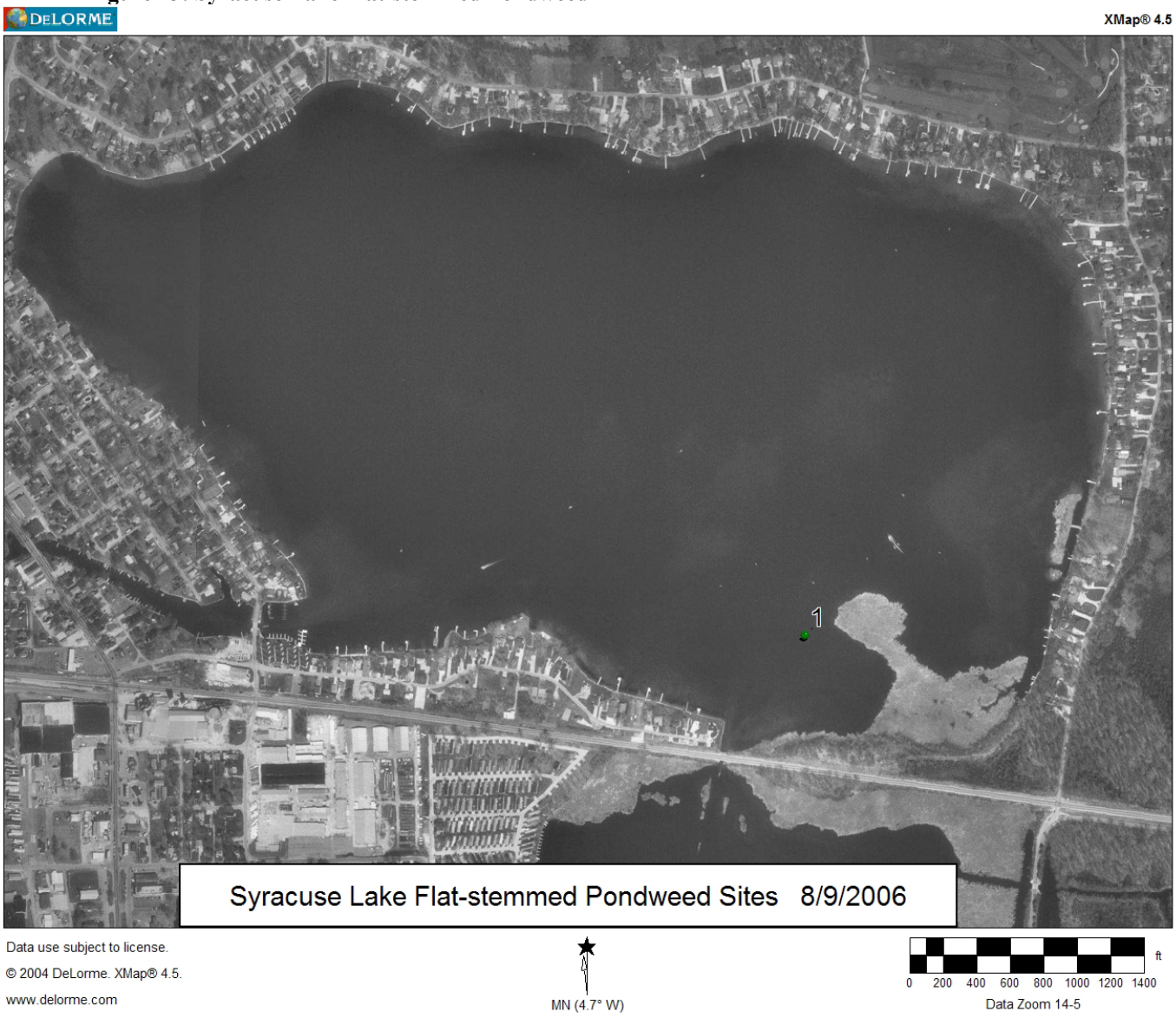


Figure 14: Syracuse Lake Illinois Pondweed

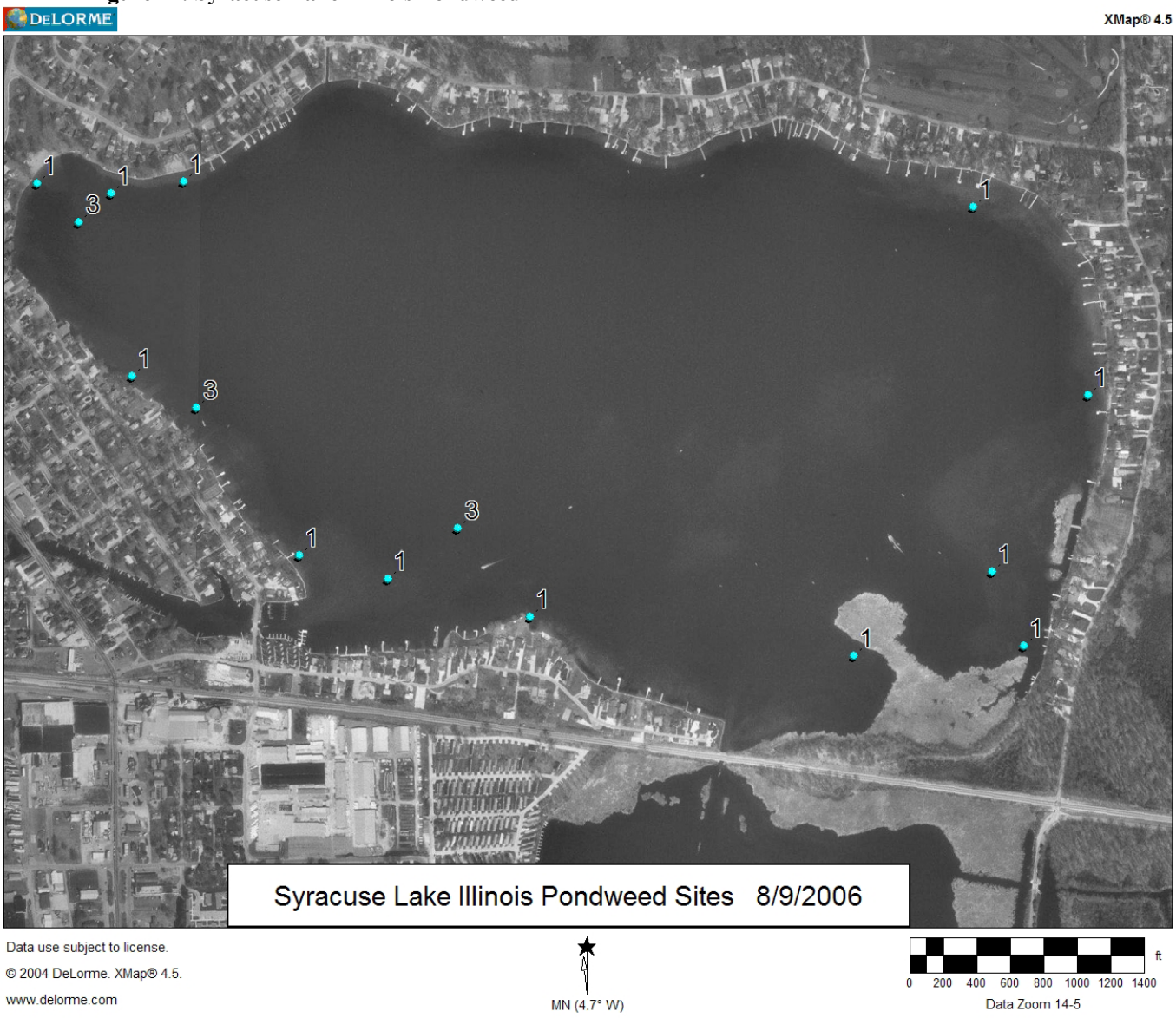


Figure 15: Syracuse Lake Illinois Pondweed

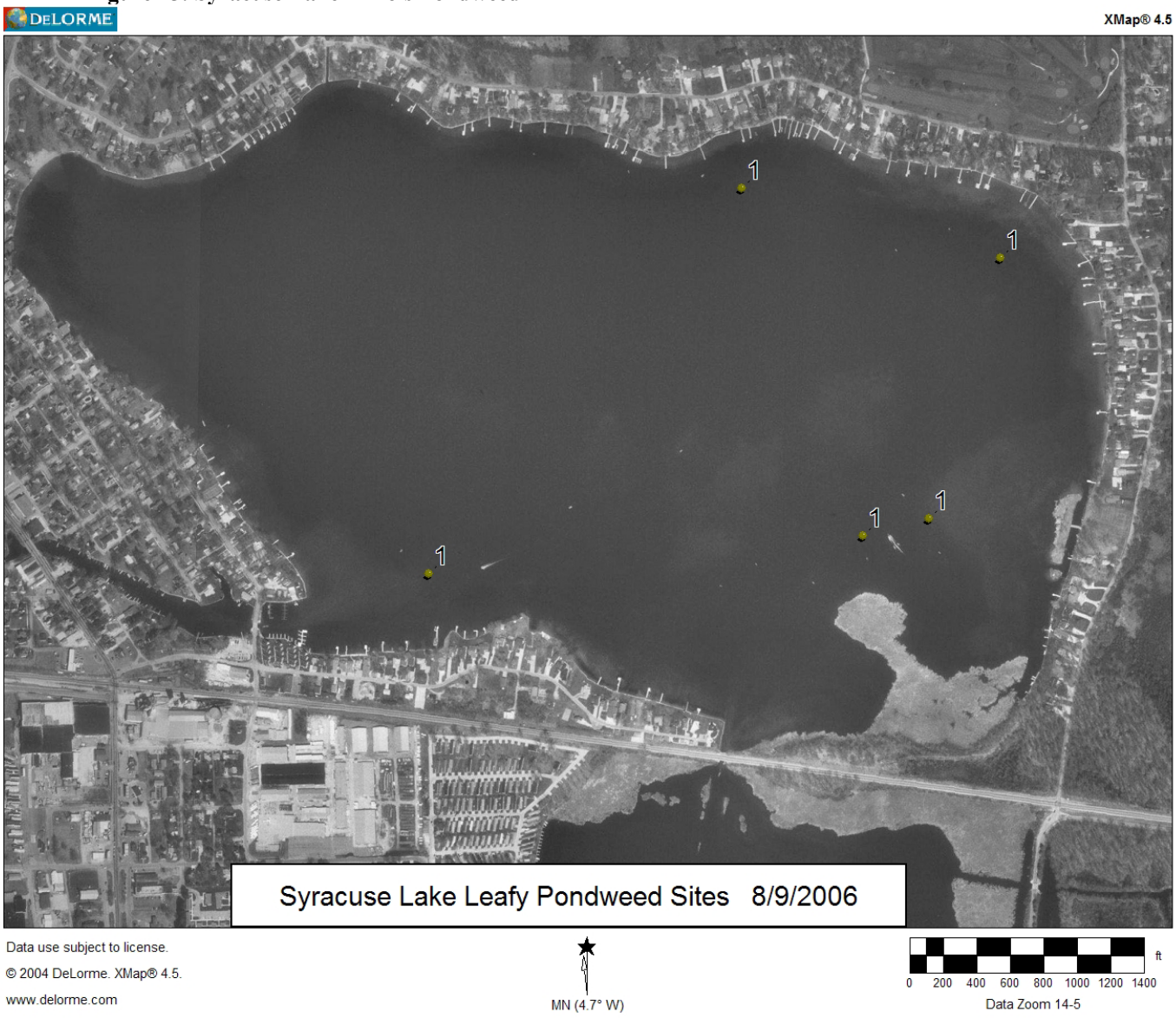


Figure 16: Syracuse Lake Northern Watermilfoil

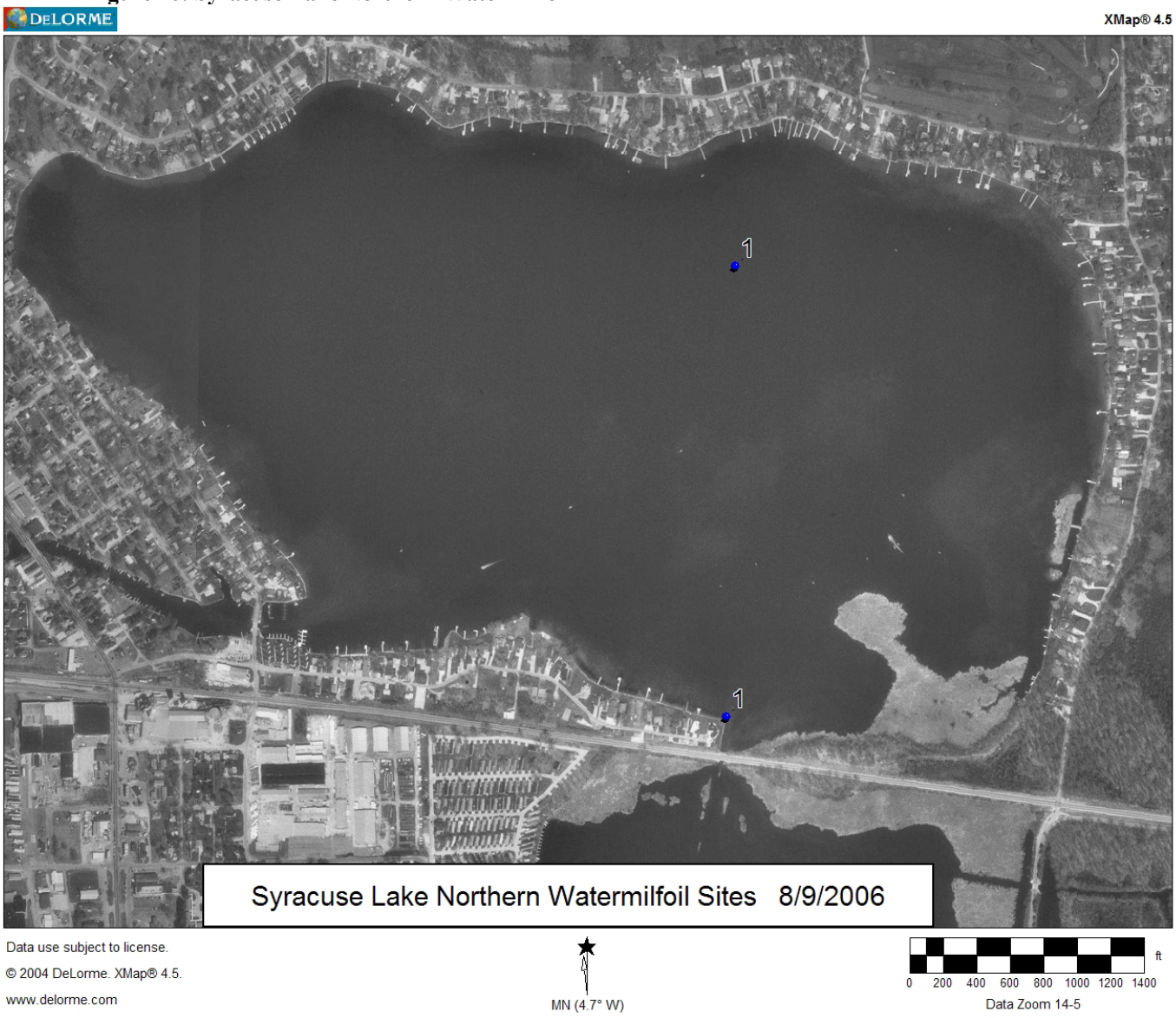


Figure 17: Syracuse Lake Richardson's Pondweed

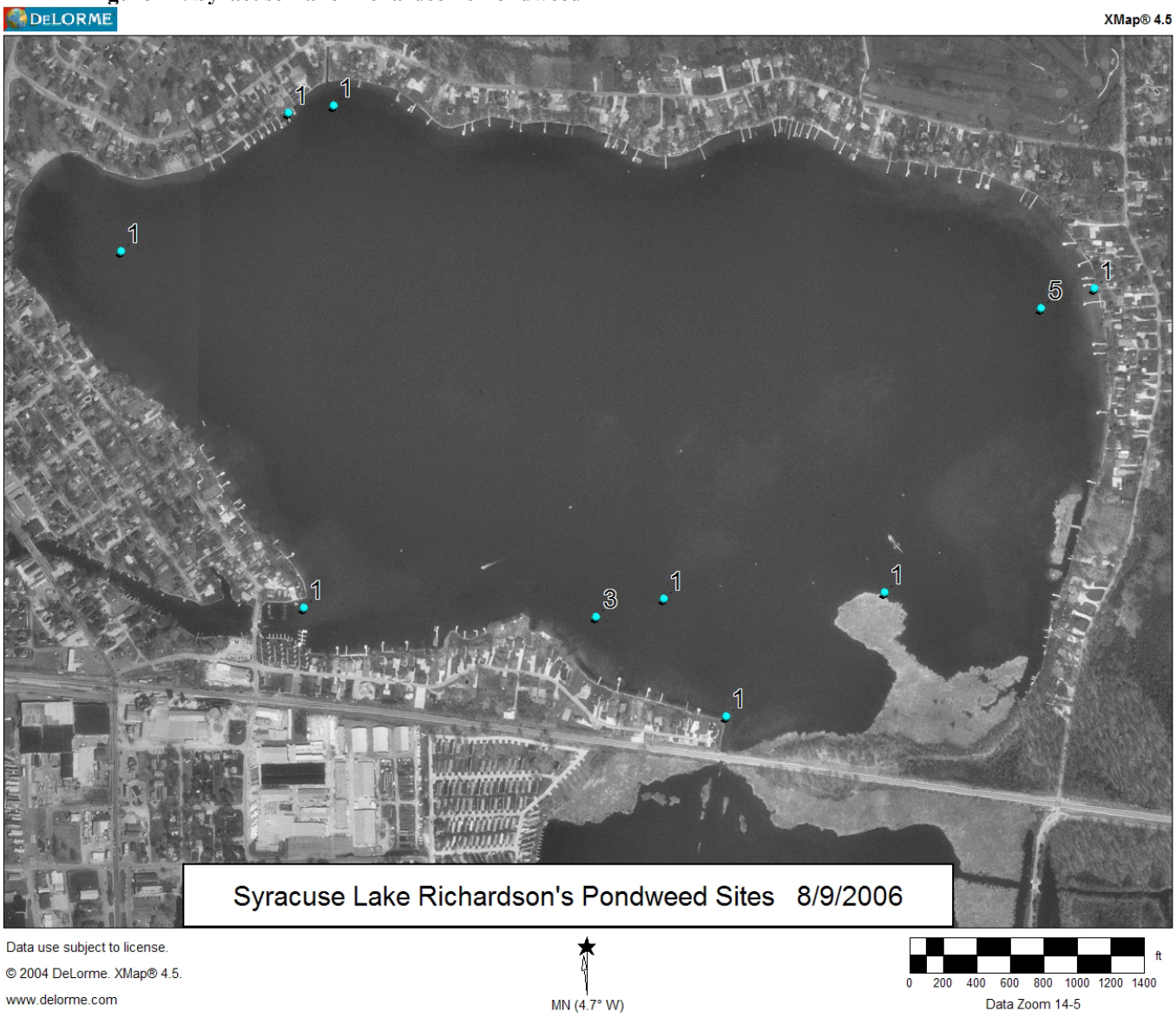


Figure 18: Syracuse Lake Sago Pondweed

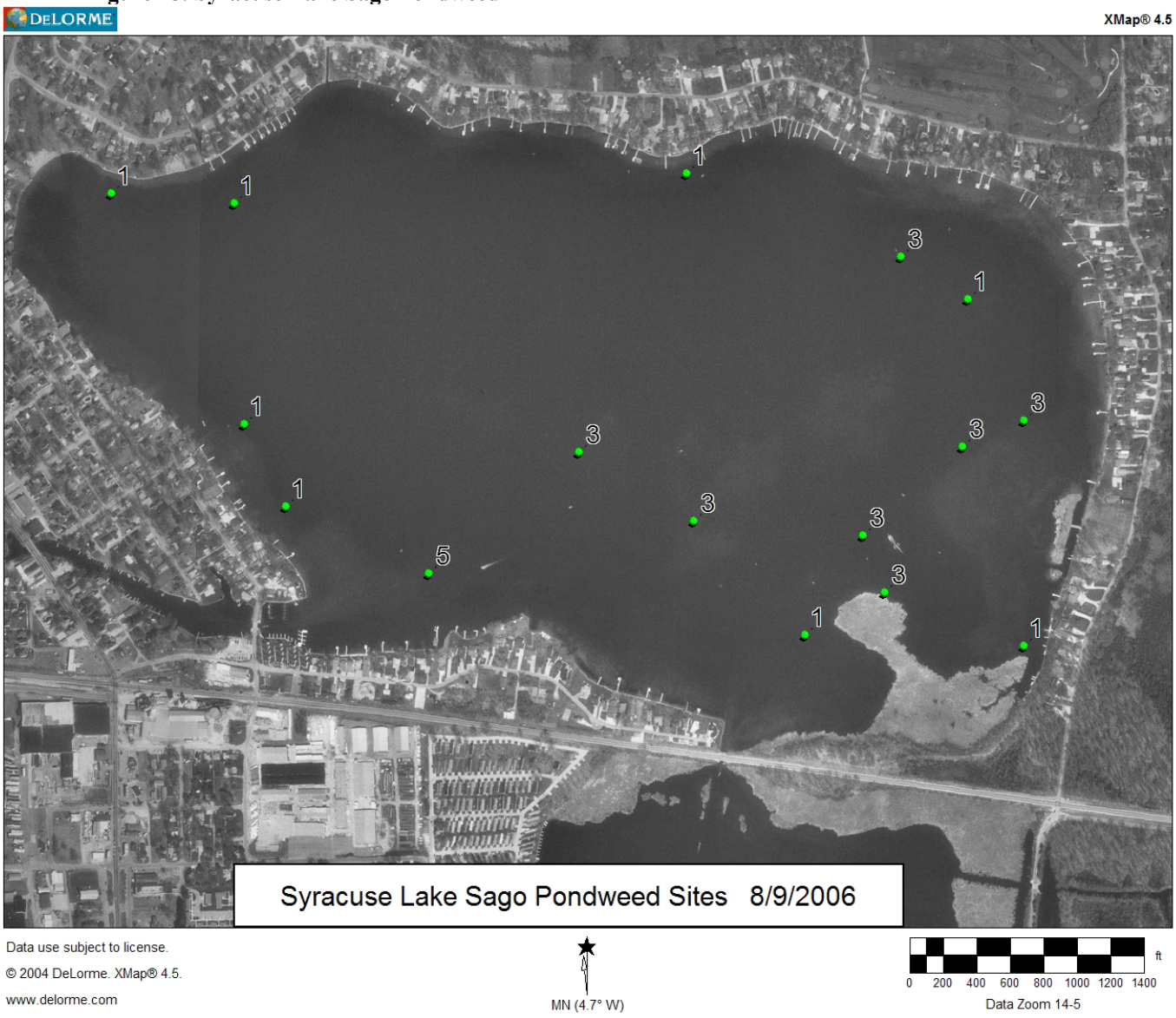


Figure 19: Syracuse Lake Slender Naiad

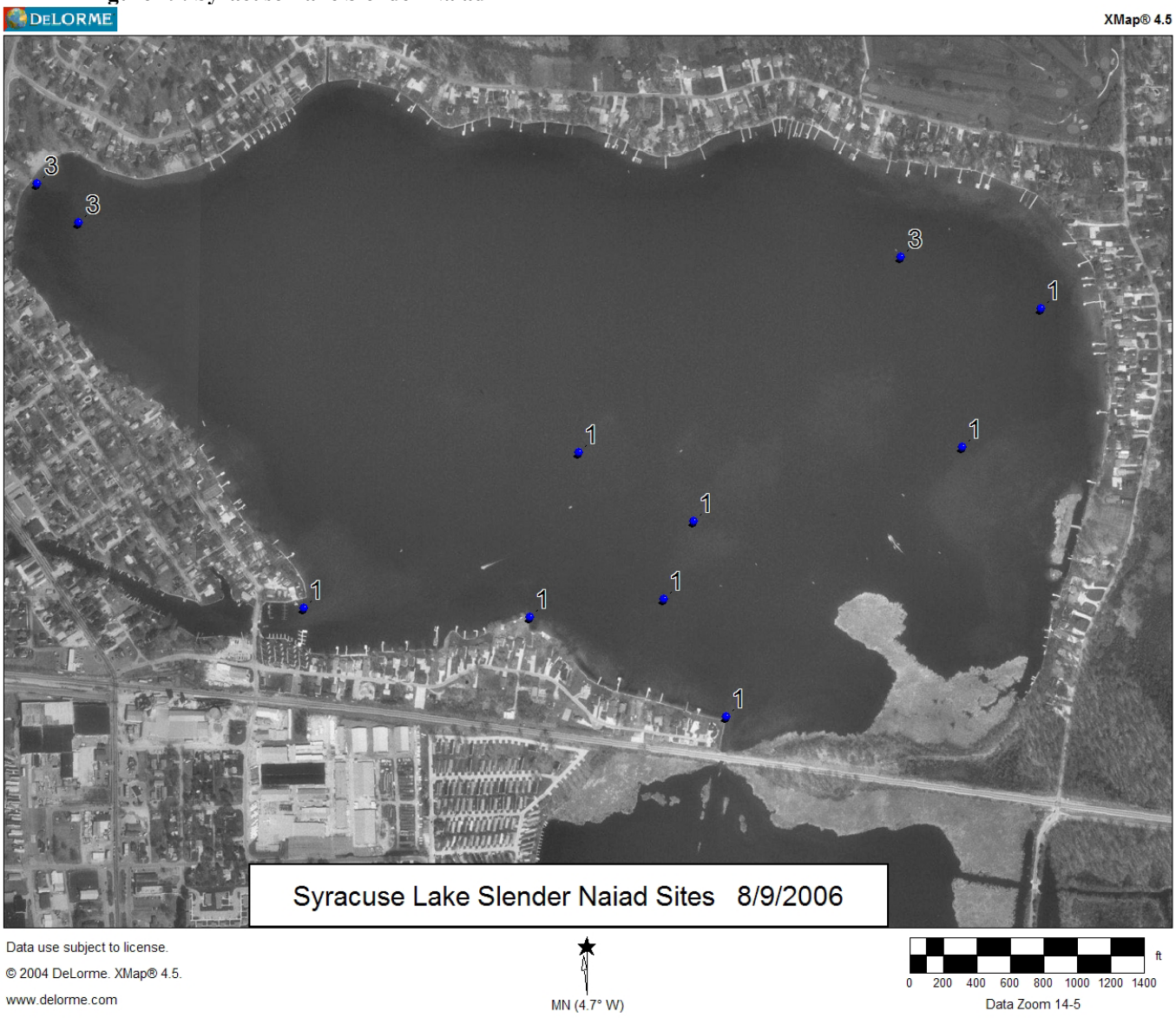
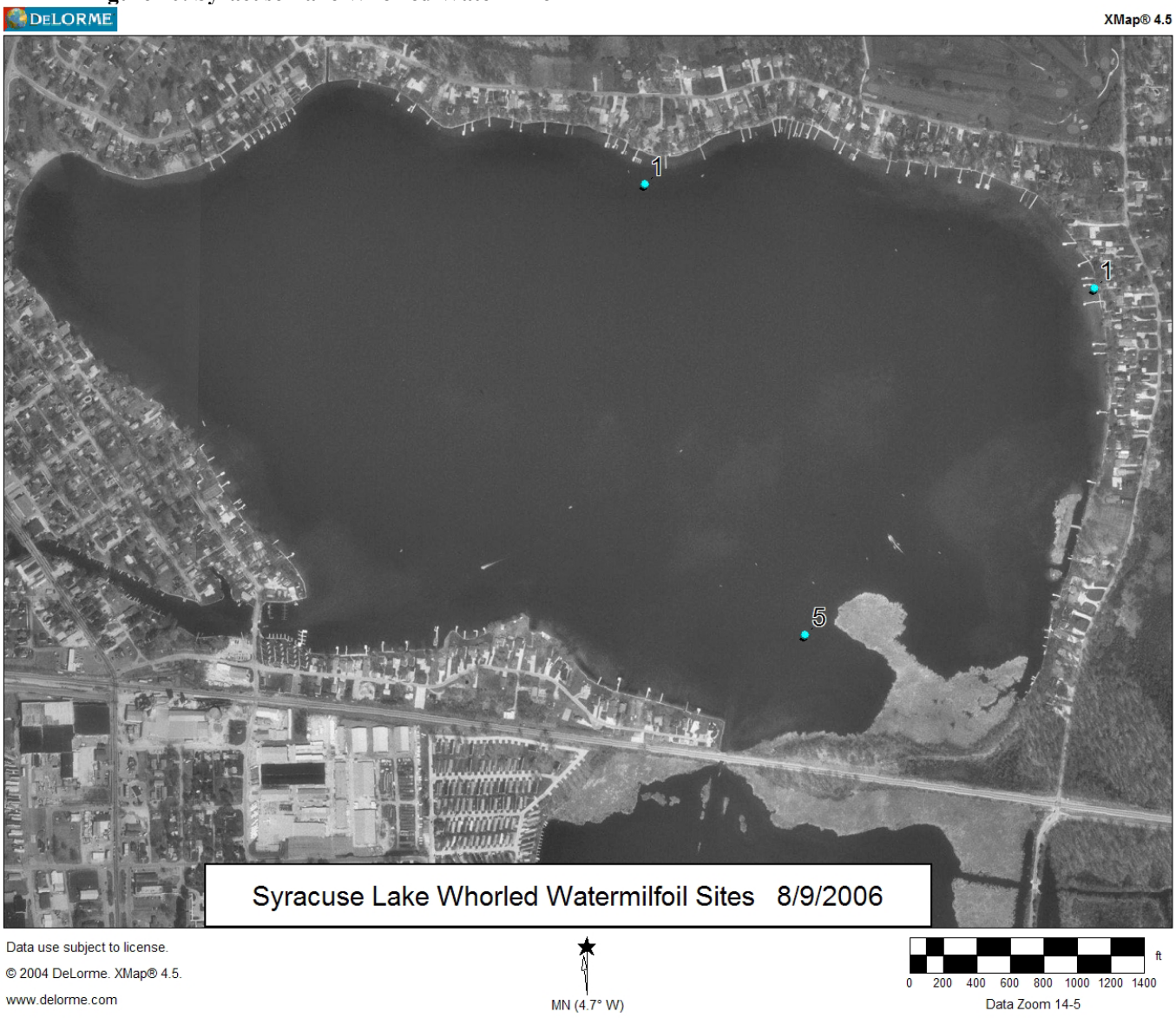
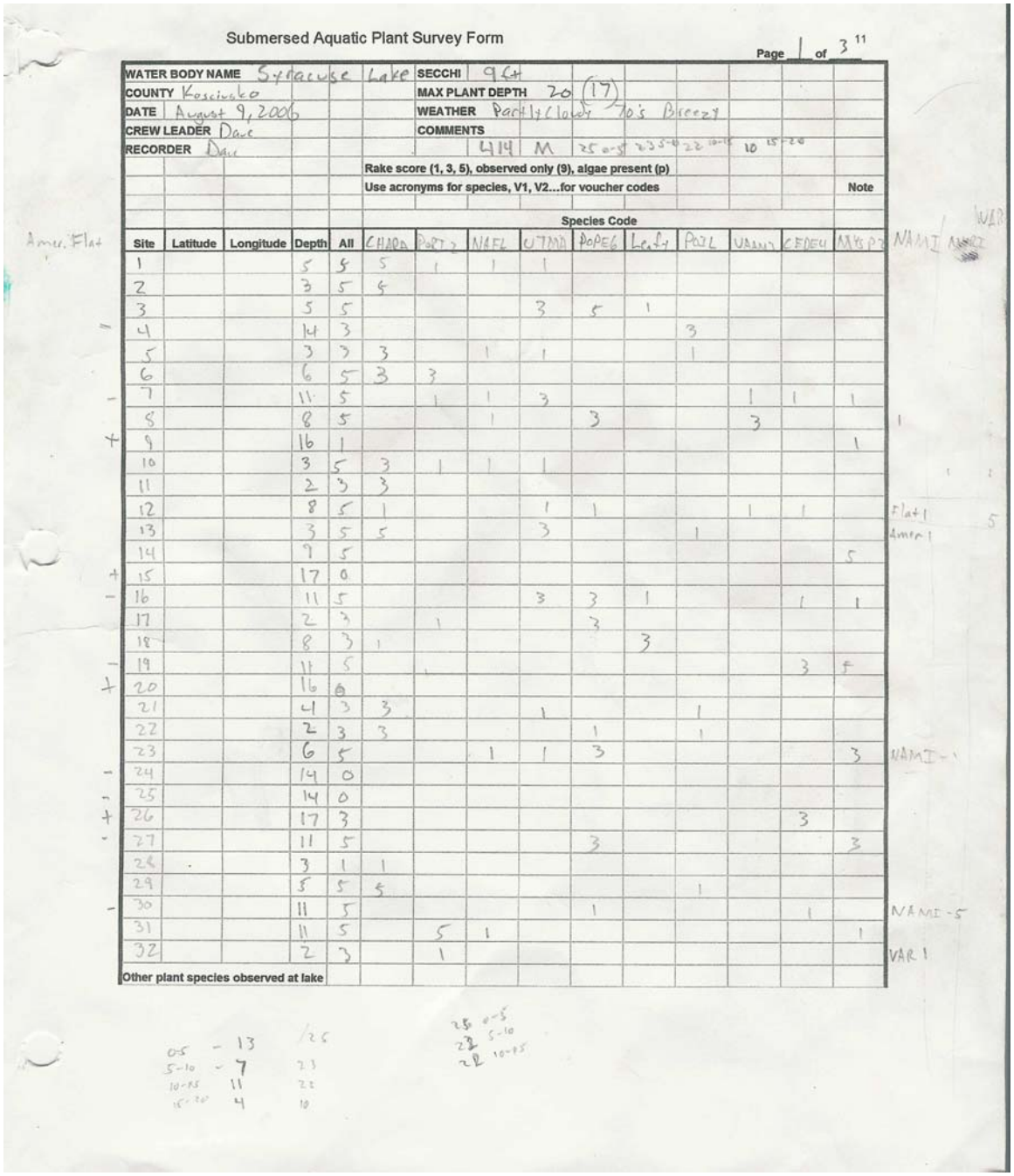


Figure 20: Syracuse Lake Whorled Watermilfoil



16.7 Data sheets



Submersed Aquatic Plant Survey Form

Page 1 of 3

WATER BODY NAME	Syracuse Lake				SECCHI	9 Ft								
COUNTY	Kosciusko				MAX PLANT DEPTH	20 (17)								
DATE	August 9, 2006				WEATHER	Partly Cloudy 70's Breezy								
CREW LEADER	Dave				COMMENTS									
RECORDER	Dave					414 M 25 0-5 23 5-10 22 10-15 10 15-20								
					Rake score (1, 3, 5), observed only (9), algae present (p)									
					Use acronyms for species, V1, V2...for voucher codes									Note
					Species Code									
Site	Latitude	Longitude	Depth	All	CHARA	PORT2	NAEL	UTMA	POPE6	Leaf4	POIL	UTRA	CEDE4	MYSP2
1			5	5	5	1	1	1						
2			3	5	5									
3			5	5				3	5	1				
4			14	3							3			
5			3	3	3		1	1			1			
6			6	5	3	3								
7			11	5		1	1	3				1	1	1
8			8	5			1		3			3		
9			16	1										1
10			3	5	3	1	1	1						
11			2	3	3									
12			8	5	1			1	1			1	1	
13			3	5	5			3			1			
14			9	5										5
15			17	0										
16			11	5				3	3	1			1	1
17			2	3		1			3					
18			8	3	1					3				
19			11	5		1							3	5
20			16	0										
21			4	3	3			1			1			
22			2	3	3				1		1			
23			6	5			1	1	3					3
24			14	0										
25			14	0										
26			17	3									3	
27			11	5					3					3
28			3	1	1									
29			5	5	5						1			
30			11	5					1				1	
31			11	5		5	1							1
32			2	3		1								
Other plant species observed at lake														

Submersed Aquatic Plant Survey Form

Page 2 of 3[11]

WATER BODY NAME	Syracuse				SECCHI	9ft								
COUNTY	Oswego				MAX PLANT DEPTH	20 (17)								
DATE	August 4, 2006				WEATHER	partly cloudy	breezy	70s						
CREW LEADER	Dave				COMMENTS	water temp 80.5								
RECORDER	Dave													
					Rake score (1, 3, 5), observed only (9), algae present (p)									
					Use acronyms for species, V1, V2...for voucher codes									Note
					Species Code									
Site	Latitude	Longitude	Depth	All	CHAR	POCR2	NAFL	UTMI	POREG	LEOC	POJI	VAAM3	CEDE	MYSP2
33			9	5						1			5	
34			12	5			3		3				1	
35			3	3	3			1						
36			6	3	3			1			1			
37			3	3	3									
38			8	3								1		3
39			9	3										
40			3	0										
41			8	5									1	5
42			18	0										
43			11	3	3					1				
44			6	3	3			1						
45			6	5	5			1	1					
46			17	1										
47			2	3	3			1						
48			11	5								5		1
49			2	3	3									
50			20	0										
51			6	3	3			1						
52			12	1	1									
53			1	1	1							1		
54			9	3		1						1	1	
55			2	3	3	1								
56			12	0										
57			1	3	3									
58			17	1					1					
59			2	3	1						1			
60			15	0										
61			6	5	3			3	1		1			
62			3	5	5		3				1	1	1	
63			10	5			3				3	3	1	
64			8	3		1						1		1
Other plant species observed at lake														

NAMI 3

MYSI - 1

VAI 1

Submersed Aquatic Plant Survey Form

Page 3 of 3 11

WATER BODY NAME	Syracuse				SECCHI	9									
COUNTY	Kosciusko				MAX PLANT DEPTH	20 (17)									
DATE	August 9, 2006				WEATHER	Partly cloudy, Breezy, 70s									
CREW LEADER	Dave				COMMENTS										
RECORDER	Dave														
					Rake score (1, 3, 5), observed only (9), algae present (p)										
					Use acronyms for species, V1, V2...for voucher codes										Note
					Species Code										
Site	Latitude	Longitude	Depth	All	CHARA	POEI?	NAFL	UTMI	POPEG	LEOC1	POTE	UTAM3	CERDEM	MYSP2	
65			11	0											
66			6	1	1										
67			13	1								1			
68			3	5	5						1				
69			13	0											
70			7	3	1						3				
71			8	5	1				1			3		1	POCR3-1
72			18	0											
73			6	5					1				3	3	
74			2	3	3			1			1				
75			6	0											
76			18	0											
77			14	5									3	3	
78			13	5									3	3	
79			12	5			1		3					3	
80			6	1	1						1				
Other plant species observed at lake															

23 08 25 2 1

17 5-10 23 16 5 4 3

16 10-15 22 8 8 4

8 10 7 4

1 5-10

10-15

Aquatic Vegetation Plant Bed Data Sheet

Page 1 of 5

State of Indiana Department of Natural Resources

ORGANIZATION: Syracuse Lake Assoc.

DATE: 6/23/06

SITE INFORMATION

Plant Bed ID: 1

Waterbody Name: Syracuse

Bed Size: 11 acres

Waterbody ID:

Substrate: 3

Total # of Species 4

Marl? 1

High Organic? 0

Canopy Abundance at Site

S: 4 N: — F: — E:

SITE COORDINATES

Center of the Bed

Latitude: N41 25.376

Longitude: W85 44.390

Max. Lakeward Extent of Bed

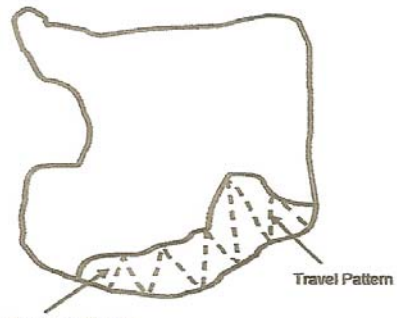
Latitude: N41 25.396

Longitude: W85 44.391

SPECIES INFORMATION

Species Code	Abundance	QE	Vchr.	Ref. ID
CHAR	4			
POIL	1			
UTMA	1			
POPE6	1			

Individual Plant Bed Survey



Comments:

REMINDER INFORMATION

Substrate:
1 = Silt/Clay
2 = Silt w/Sand
3 = Sand w/Silt
4 = Hard Clay
5 = Gravel/Rock
6 = Sand

Marl
1 = Present
0 = absent

High Organic
1 = Present
0 = absent

Overall Surface Cover
N = Nonrooted floating
F = Floating, rooted
E = Emergent
S = Submersed

Canopy:
1 = < 2%
2 = 2-20%
3 = 21-60%
4 = > 60%

Abundance:
1 = < 2%
2 = 2-20%
3 = 21-60%
4 = > 60%

QE Code:
0 = as defined
1 = Species suspe
2 = Genus suspected
3 = Unknown

Voucher:
0 = Not Taken
1 = Taken, not varified
2 = Taken, varifier

Reference ID:
Unique number or letter to denote specific location of a species; referenced on attached map

Aquatic Vegetation Plant Bed Data Sheet

Page 2 of 5

State of Indiana Department of Natural Resources

ORGANIZATION: Syracuse Lake

DATE: 6/23/06

SITE INFORMATION

Plant Bed ID: 3 2

Waterbody Name: Syracuse

Bed Size: 175

Substrate: 3

Waterbody ID:

Marl? 1

Total # of Species 7

High Organic? 0

Canopy Abundance at Site

S: 4 N: — P: — E: —

SITE COORDINATES

Center of the Bed

Latitude: N41 25.315

Longitude: W85 43.917

Max. Lakeward Extent of Bed

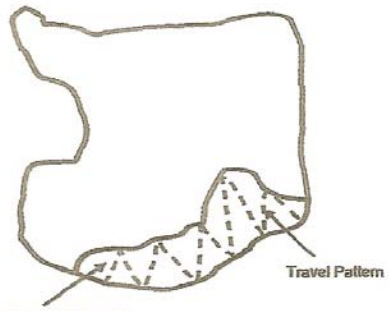
Latitude: N41 25.387

Longitude: W85 43.971

SPECIES INFORMATION

Species Code	Abundance	QE	Vchr.	Ref. ID
POND	2			
CHTAR	3			
CEDEL	1			
POIL	1			
UTMA	2			

Individual Plant Bed Survey



Comments:

REMINDER INFORMATION

Substrate:
1 = Silt/Clay
2 = Silt w/Sand
3 = Sand w/Silt
4 = Hard Clay
5 = Gravel/Rock
6 = Sand

Marl
1 = Present
0 = absent

High Organic
1 = Present
0 = absent

Overall Surface Cover
N = Nonrooted floating
F = Floating, rooted
E = Emergent
S = Submersed

Canopy:
1 = < 2%
2 = 2-20%
3 = 21-60%
4 = > 60%

Abundance:
1 = < 2%
2 = 2-20%
3 = 21-60%
4 = > 60%

QE Code:
0 = as defined
1 = Species susp
2 = Genus suspected
3 = Unknown

Voucher:
0 = Not Taken
1 = Taken, not varified
2 = Taken, varifie

Reference ID:
Unique number or letter to denote specific location of a species; referenced on attached map

Aquatic Vegetation Plant Bed Data Sheet

Page 2 of 5

State of Indiana Department of Natural Resources

ORGANIZATION: Syracuse Lake

DATE: 6/23/06

SITE INFORMATION

Plant Bed ID: S3

Waterbody Name: Syracuse

Bed Size: 37.5 acres

Substrate: 3

Waterbody ID:

Marl? 1

Total # of Species 5

High Organic? 0

Canopy/Abundance at Site

S: 4 | N: – | F: – | E: –

SITE COORDINATES

Center of the Bed

Latitude: N41 25.783

Longitude: W85 43.689

Max. Lakeward Extent of Bed

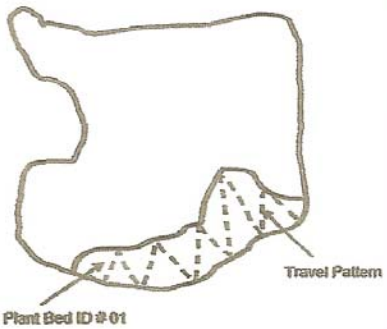
Latitude: N41 25.774

Longitude: W85 43.816

SPECIES INFORMATION

Species Code	Abundance	QE	Veluc.	Ref. ID
UTXA	2			
CHZAR	3			
POIL	1			
POPEL	1			
POCR3	1			

Individual Plant Bed Survey



Comments:

REMINDER INFORMATION

Substrate:
1 = Silt/Clay
2 = Silt w/Sand
3 = Sand w/Silt
4 = Hard Clay
5 = Gravel/Rock
6 = Sand

Marl
1 = Present
0 = absent

High Organic
1 = Present
0 = absent

Overall Surface Cover
N = Nonrooted floating
F = Floating, rooted
E = Emergent
S = Submersed

Canopy:
1 = < 2%
2 = 2-20%
3 = 21-60%
4 = > 60%

Abundance:
1 = < 2%
2 = 2-20%
3 = 21-60%
4 = > 60%

QE Code:
0 = as defined
1 = Species susp
2 = Genus suspected
3 = Unknown

Voucher:
0 = Not Taken
1 = Taken, not verified
2 = Taken, verified

Reference ID:
Unique number or letter to denote specific location of a species; referenced on attached map

Aquatic Vegetation Plant Bed Data Sheet

Page 4 of 5

State of Indiana Department of Natural Resources

ORGANIZATION: Syracuse Lake

DATE: 6/22/06

SITE INFORMATION

Plant Bed ID: S4

Bed Size: 30 acres

Substrate: 2

Marl? 0

High Organic? 1

Waterbody Name: Syracuse

Waterbody ID:

Total # of Species 4

Canopy Abundance at Site: S: 4 E: – F: – E: –

SITE COORDINATES

Center of the Bed

Latitude: N41 25.582

Longitude: W85 43.936

Max. Lakeward Extent of Bed

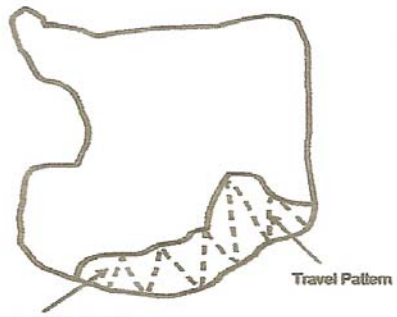
Latitude: N41 25.578

Longitude: W85 44.278

SPECIES INFORMATION

Species Code	Abundance	QE	Vchr.	Ref. ID
CEDEM	2			
MYSP2	3			
UTMA	2			
POPEL	1			

Individual Plant Bed Survey



Comments:

REMINDER INFORMATION

Substrate:
1 = Silt/Clay
2 = Silt w/Sand
3 = Sand w/Silt
4 = Hard Clay
5 = Gravel/Rock
6 = Sand

Marl
1 = Present
0 = absent

High Organic
1 = Present
0 = absent

Overall Surface Cover
N = Nonrooted floating
F = Floating, rooted
E = Emergent
S = Submersed

Canopy:
1 = < 2%
2 = 2-20%
3 = 21-60%
4 = > 60%

Abundance:
1 = < 2%
2 = 2-20%
3 = 21-60%
4 = > 60%

QE Code:
0 = as defined
1 = Species suspected
2 = Genus suspected
3 = Unknown

Voucher:
0 = Not Taken
1 = Taken, not verified
2 = Taken, verified

Reference ID:
Unique number or letter to denote specific location of a species; referenced on attached map

Aquatic Vegetation Plant Bed Data Sheet

Page 5 of 5

State of Indiana Department of Natural Resources

ORGANIZATION: Syracuse Lake — DATE: 6/23/06

SITE INFORMATION

Plant Bed ID: 5 5 — Waterbody Name: Syracuse

Bed Size: 28 acres — Waterbody ID:

Substrate: 3 — Total # of Species 9

Marl? 1

High Organic? 1

Canopy/Abundance at Site

S:	M:	F:	E:

SITE COORDINATES

Center of the Bed

Latitude: N41 25. 763

Longitude: W85 44. 443

Max. Lakeward Extent of Bed

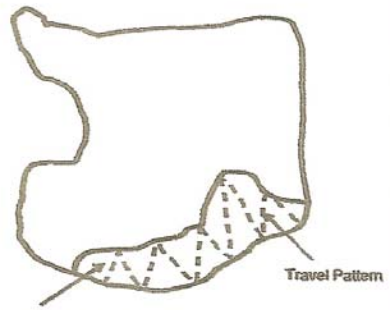
Latitude: N41 25 737

Longitude: W85 44. 689

SPECIES INFORMATION

Species Code	Abundance	QE	Voluc.	Ref. ID
MYSP2	3			
POFL	2			
LEDE4	2			
CHAR	2			
UTMA	2			
MYST	1			
POPE6	1			
POZO	1			
POCR3	1			

Individual Plant Bed Survey



Comments:

REMINDER INFORMATION

Substrate:
1 = Silt/Clay
2 = Silt w/Sand
3 = Sand w/Silt
4 = Hard Clay
5 = Gravel/Rock
6 = Sand

Marl
1 = Present
0 = absent

High Organic
1 = Present
0 = absent

Overall Surface Cover
N = Nonrooted floating
F = Floating, rooted
E = Emergent
S = Submersed

Canopy:
1 = < 2%
2 = 2-20%
3 = 21-60%
4 = > 60%

Abundance:
1 = < 2%
2 = 2-20%
3 = 21-60%
4 = > 60%

QE Code:
0 = as defined
1 = Species susp.
2 = Genus suspected
3 = Unknown

Voucher:
0 = Not Taken
1 = Taken, not verified
2 = Taken, verified

Reference ID:
Unique number or letter to denote specific location of a species; referenced on attached map

16.8 IDNR Aquatic Vegetation Permit

APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT

State Form 26727 (R4 / 2-04)
Approved State Board of Accounts 2004
[ ] Whole Lake [X] Multiple Treatment Areas
Check type of permit

INSTRUCTIONS: Please print or type information

FOR OFFICE USE ONLY
License No.
Date Issued
Lake County

Return to: Page 1 of
DEPARTMENT OF NATURAL RESOURC
Division of Fish and Wildlife
Commercial License Clerk
402 West Washington Street, Room W2
Indianapolis, IN 46204

FEE: $5.00

Applicant's Name	Lake Assoc. Name	
	Syracuse Lake Association	
Rural Route or Street		Phone Number
P. O. Box 12		574-457-3611
City and State		ZIP Code
Syracuse IN		46567
Certified Applicator (if applicable)	Company or Inc. Name	Certification Number
Rural Route or Street		Phone Number
City and State		ZIP Code

Lake (One application per lake)	Nearest Town	County
Syracuse	Syracuse	Kosciusko
Does water flow into a water supply	[ ] Yes	[X] No

Please complete one section for *EACH* treatment area. Attach lake map showing treatment area and denote location of any water supply int

Treatment Area #	1	LAT/LONG or UTM's	N41degrees 25.777 W85 degrees 44.929	
Total acres to be controlled	18.3	Proposed shoreline treatment length (ft)	100	Perpendicular distance from shoreline (ft) 8000
Maximum Depth of Treatment (ft)	5	Expected date(s) of treatment(s)	Mid May, June, July	

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. 2-4D

Plant survey method: [ ] Rake [X] Visual [ ] Other (specify)

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eurasian milfoil	X	28.4
Chara		60.5
Northern milfoil		11.1
Illinois Pondweed		8.6
Coontail		4.9
Curley Leaf		4.9
Leafy Pondweed		4.9

Page ____ of

Treatment Area #	2	LAT/LONG or UTM's	N41 degrees 25.426 W85 degrees 44.280
Total acres to be controlled	9.18	Proposed shoreline treatment length (ft)	100
Maximum Depth of Treatment (ft)	5	Expected date(s) of treatment(s)	late June early July

Perpendicular distance from shoreline (ft) 4000

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. 2-4D

Plant survey method: [ ] Rake [X] Visual [ ] Other (specify)

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eurasian milfoil	X	28.4
Chara		60.5
Northern milfoil		11.1
Illinois Pondweed		8.6
Coontail		4.9
Curley Leaf		4.9
Leafy Pondweed		4.9

INSTRUCTIONS: Whoever treats the lake fills in "Applicant's Signature" unless they are a professional. If they are a professional company who specializes in lake treatment, they should sign on the "Certified Applicant" line.

Applicant Signature	Date
Certified Applicant's Signature	Date

FOR OFFICE ONLY

[ ] Approved [ ] Disapproved	Fisheries Staff Specialist
[ ] Approved [ ] Disapproved	Environmental Staff Specialist

Mail check or money order in the amount of $5.00 to:

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF FISH AND WILDLIFE
COMMERCIAL LICENSE CLERK
402 WEST WASHINGTON STREET ROOM W273
INDIANAPOLIS, IN 46204

Page ___ of

Treatment Area # 3	LAT/LONG or UTM's N41 degrees 25.586 W85 degrees 43.874		
Total acres to be controlled 15.15	Proposed shoreline treatment length (ft) 100	Perpendicular distance from shoreline (ft) 6000	
Maximum Depth of Treatment (ft) 5	Expected date(s) of treatment(s) late June to early July		

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. 2, 4 - D

Plant survey method: [ ] Rake [X] Visual [ ] Other (specify)

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eurasian milfoil	X	28.4
Chara		60.5
Northern milfoil		11.1
Illinois Pondweed		8.6
Coontail		4.9
Curley Leaf		4.9
Leafy Pondweed		4.9

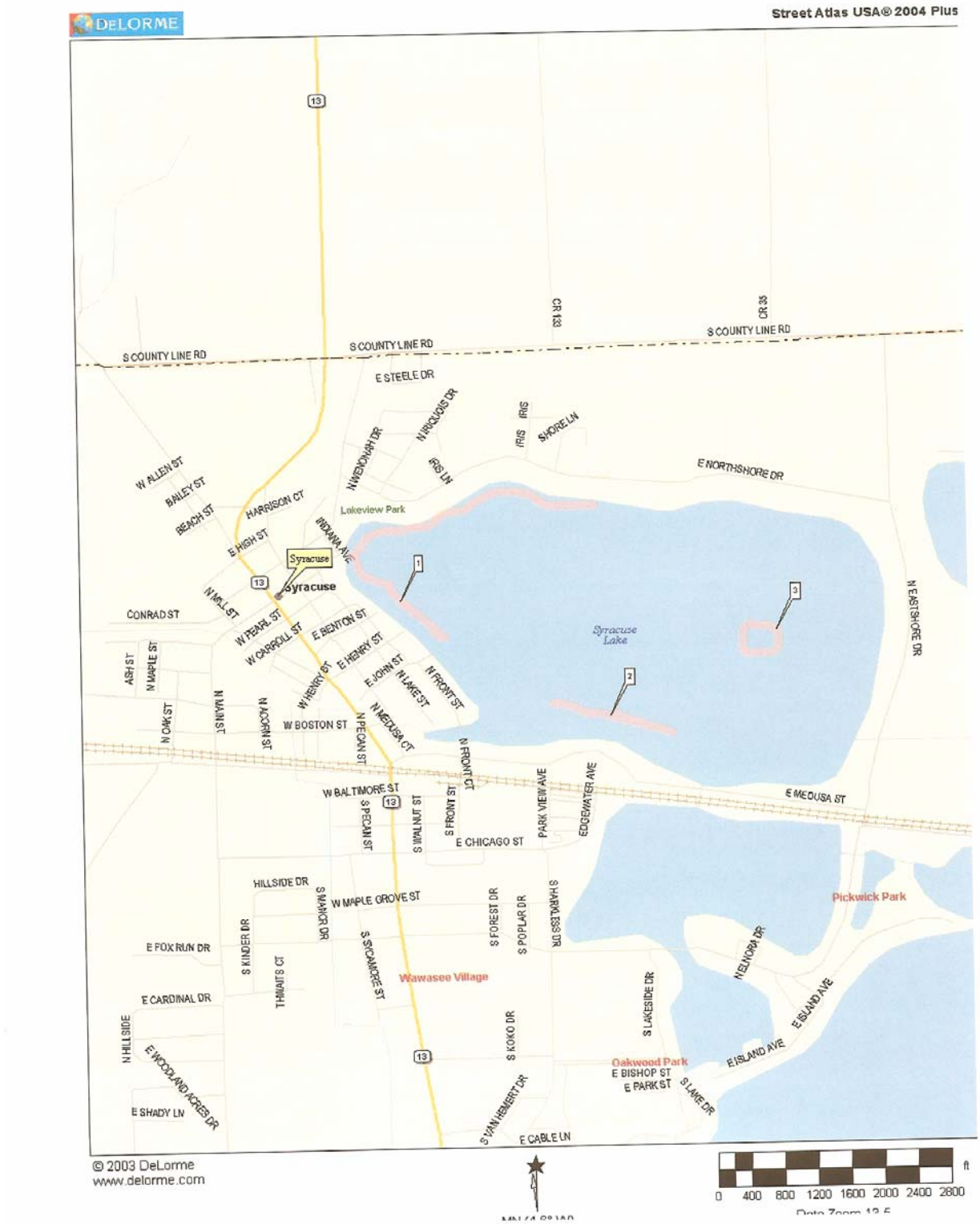
Treatment Area #	LAT/LONG or UTM's	
Total acres to be controlled	Proposed shoreline treatment length (ft)	Perpendicular distance from shoreline (ft)
Maximum Depth of Treatment (ft)	Expected date(s) of treatment(s)	

Treatment method: [ ] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control.

Plant survey method: [ ] Rake [ ] Visual [ ] Other (specify)

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community


DeLORME
Street Atlas USA® 2004 Plus
S COUNTY LINE RD
CR 133
CR 33
E STEELE DR
N NICOLOSIS DR
IRIS
SHORE LN
E NORTHSHORE DR
W ALLEN ST
BAILEY ST
BEECH ST
HARRISON CT
E HIGH ST
INDIANA AVE
Lakeview Park
Syracuse
CONRAD ST
N MILL ST
W PEARL ST
W CARROLL ST
E BENTON ST
E HENRY ST
E JOHN ST
N LAKE ST
N FRONT ST
N EASTSHORE DR
Syracuse Lake
ASH ST
N MAPLE ST
N OAK ST
N MAIN ST
N COCHRAN ST
W HENRY ST
W BOSTON ST
N PECAN ST
N MEDUSA CT
W BALTIMORE ST
S PECAN ST
S WALNUT ST
S FRONT ST
N FRONT CT
E CHICAGO ST
PARK VIEW AVE
EDGEWATER AVE
E MEDUSA ST
HILLSIDE DR
W MAPLE GROVE ST
S MAPLE DR
S KINDER DR
S FOREST DR
S POPLAR DR
SYCAMORELESS DR
Pickwick Park
E FOX RUN DR
THWAITS CT
S SYCAMORE ST
Wawasee Village
NELNORA DR
E ISLAND AVE
E CARDINAL DR
N HILLSIDE
S KOKO DR
S LAKESIDE DR
Oakwood Park
E BISHOP ST
E PARK ST
S LAKE DR
E WOODLAND ACRES DR
E SHADY LN
S VAN HEMERT DR
E CABLE LN
© 2003 DeLorme
www.delorme.com
ft
0 400 800 1200 1600 2000 2400 2800